THE BOOK OF BIRDS

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Birds

THE BOOK OF BIRDS

COMMON BIRDS OF TOWN AND COUNTRY

AND

AMERICAN GAME BIRDS

BY

HENRY W. HENSHAW

FORMERLY CHIEF UNITED STATES BIOLOGICAL SURVEY

ILLUSTRATED IN NATURAL COLORS WITH 250 PAINTINGS

BY

LOUIS AGASSIZ FUERTES

WITH CHAPTERS ON "ENCOURAGING BIRDS AROUND THE HOME," BY F. H. KENNARD; "THE MYSTERIES OF BIRD MIGRATION," BY WELLS W. COOKE, AND "HOW BIRDS CAN TAKE THEIR OWN PORTRAITS," BY GEORGE SHIRAS, 3RD, AND 45 ILLUSTRATIONS AND 13 CHARTS IN BLACK AND WHITE.

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OUR FEATHERED FRIENDS

IN THIS VOLUME are presented the principal articles and the most beautiful color illustrations of man's feathered friends which have been published in the National Geographic Magazine during the last six years. The text and pictures comprise one of the most valuable and fascinatingly interesting contributions to popular science the National Geographic Society has devised, and the most comprehensive and charming handbook of avian lore that has ever been offered at a moderate price.

The 250 illustrations in color of the Common Birds of Town and Country, of our Warblers and American Game Birds, are reproductions of the matchless pictures from the brush of the distinguished artist-naturalist, Louis Agassiz Fuertes, while the descriptive text by Henry W. Henshaw, formerly Chief of the U. S. Biological Survey, sets forth concisely, entertainingly, yet with scientific accuracy, the distinguishing characteristics of each species of bird, its peculiar habits, and its favorite habitat.

Dr. Henshaw has pointed out the need for the preservation of bird life, and how the farmer without his feathered insect-destroyers would face constant disaster to his crops.

Few wonders of the natural world are as compelling in interest as is the display of that mysterious impulse which is followed season after season by the birds which migrate from their winter homes to their nesting places in the spring, and then make the return journey in the fall, guided no one knows how—an absorbing study for both layman and scientist. The article by the late Wells W. Cooke, "Our Greatest Travelers: Birds that Fly from Pole to Pole, etc.," gives a most comprehensive and engaging digest of these mysterious migrations, and the text is elucidated by a series of illuminating maps and charts.

Frederick H. Kennard's article, "Encouraging Birds Around the Home," accompanied by numerous illustrations in black and white, tells with the bird-lover's enthusiasm how every reader, be he

proprietor of a great estate or the owner of a window-sill, can make the acquaintance and win the confidence of birds, adding them to his circle of appreciative friends and charming visitors.

George Shiras, 3rd, the inventor of flashlight photography of wild animals and of methods of making animals and birds take their own portraits, gives some useful hints on the latter subject.

Utility, beauty, and art are served alike when man befriends the birds.

GILBERT GROSVENOR,
Director and Editor.



Photograph by Howard H. Cleaves

THE EXCITEMENT OF TOUCHING THE ECCENTRIC WOODCOCK ON THE BACK

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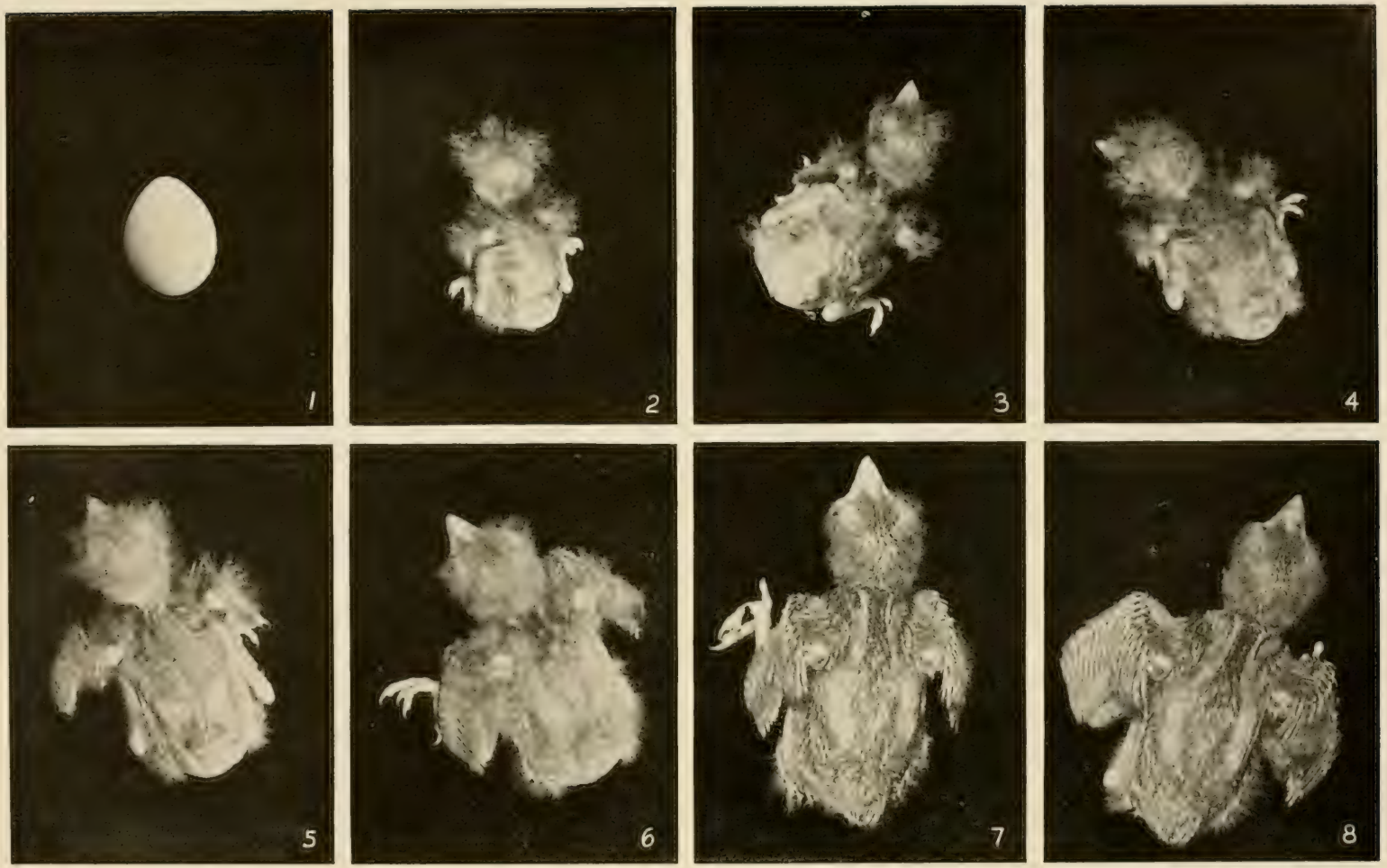
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Photographs by George Shiras, 3rd

ONE OF NATURE'S HYDROPLANES

Two striking pictures showing the rising flight of a pelican. In the upper illustration the wings are seen at different angles; the lower picture shows the wings outspread, and the resemblance to a Canada goose is marked.



Photograph by George Shiras, 3rd

THE EGG OF A PHŒBE AND SEVEN CONSECUTIVE DAYS' GROWTH OF YOUNG (LIFE SIZE)

The bird left the nest on the eleventh day

COMMON BIRDS OF TOWN AND COUNTRY

By HENRY W. HENSHAW

Formerly Chief of the U. S. Biological Survey

With Illustrations from Paintings by Louis Agassiz Fuertes

FROM very ancient times birds have appealed to the interest and imagination of mankind. They have furnished themes for innumerable poets, have appeared in many guises in primitive religions, and by their flight inspired the predictions of the soothsayers of old. Even in these modern and prosaic times birds still continue to interest mankind, and the last decade has witnessed a marked strengthening of the sentiment toward them.

The present interest is direct and personal, and today hundreds of thousands of men and women in various parts of the country, old as well as young, are employing much of their leisure in familiarizing themselves with the birds of their respective localities. In following birds afield, in studying their habits, and listening to their songs, they bring themselves into close touch and sympathy with Nature and add new zest to life—a zest, be it noted, which enriches without harm to any creature.

Would that the same could be said of the sportsman who almost invariably is at heart a nature lover, though the primitive instinct to kill is uppermost. Many sportsmen, however, who formerly followed wild creatures only to kill, have abandoned the use of rifle and shotgun, and today are finding greater pleasure in studying and photographing their former quarry than they did in pursuing it with murderous intent. A real interest in wild life leads naturally to a love of Nature in all her varied manifestations, and this, in all lands and under all circumstances, remains a source of lasting pleasure.

A love of birds from the esthetic side, however, is of comparatively recent development and had little place among primitive peoples, who utilized birds chiefly in two ways—for food and for ornament. Feathers, especially, appealed to them for purposes of adornment, and this barbaric taste has not only survived among civilized races, but in recent years has developed to an extent which threatens the very existence of many of the most beautiful and notable species of birds in various parts of the world. No region is too remote, no forests too deep, no mountains too high to stay the plume-hunter, stimulated by the golden bribe offered by the tyrant Fashion.

Happily, America has taken the lead in an attempt to restrict this craze for feather adornment, which means nothing less than the death of millions of beautiful and useful creatures. Nor are evidences wanting that other countries as well have recognized the gravity of the situation and are preparing to pass protective laws similar to those recently enacted in this country.

BIRDS ARE THE FARMERS' MOST EFFICIENT ALLIES

While birds appeal to the regard and interest of man from the esthetic side as no other creatures do, there is another and even more important point of view, and it is no doubt true that of late years interest in birds has been greatly stimulated by the discovery that they possess an economic value.

The study of the economic side of bird life and of the relations of birds to the farmer and horticulturist has been greatly stimulated in the United States by Federal aid and supervision, and in no other country in the world have the activities of birds been so carefully investigated with reference to their practical bearing.

Under the Biological Survey of the Department of Agriculture, for instance, is a corps of trained men, who study the food of birds by careful examination of the stomachs of specimens killed for scientific purposes. The information thus gained is supplemented by observations

in the field, and the result is a large amount of invaluable data illustrative of the economic relations of many kinds of birds. This storehouse of information has been largely drawn upon in the following pages.

OUR COUNTRY IS PARTICULARLY FORTUNATE IN THE NUMBER AND VARIETY OF ITS BIRDS

It would be strange indeed if our land, with its vast extent of territory, its diversified landscape, its extensive forests, its numerous lakes and streams, with its mountains, prairies, and plains, had not been provided by Nature with an abundant and diversified bird life. As a matter of fact, America has been favored with a great variety of birds famed both for beauty and for song. America also possesses certain families, as the humming-birds and wood-warblers, the like of which exist nowhere else in the world.

In considering the many kinds of birds in the United States from the practical side, they may not inaptly be compared to a police force, the chief duty of which is to restrain within bounds the hordes of insects that, if unchecked, would devour every green thing. To accomplish this task successfully, the members of the force must be variously equipped, as we find they are. Indeed, while the 1,200 kinds of birds that inhabit the United States can be grouped in families which resemble each other in a general way, yet among the members of the several families are marked variations of form and plumage and still greater variation of habits, which fit them for their diversified duties.

As the bulk of insects spend more or less time on the ground, so we find that more birds are fitted for terrestrial service than for any other. Our largest bird family, the sparrows, is chiefly terrestrial, and although its members depend much upon seeds for subsistence they spend no little share of their time searching for insects. They are ably aided in the good work by the thrushes, wrens, certain of the warblers, and many other birds.

Another group is of arboreal habits, and plays an important part in the conservation of our forests, the true value of which we have only recently learned to appreciate. So many insects burrow into trees that a highly specialized class of birds — the woodpeckers — has been developed to dig them out. The bills, tongues, feet, and even the tails of these birds have been cunningly adapted to this one end, and the manner in which this has been done shows how fertile Nature is in equipping her servants to do her bidding.

The bark of trees also forms a favorite shelter for numerous insects, and behold the wrens, nuthatches, warblers, and creepers, with sharpest of eyes and slenderest of bills, to detect our foes and to dislodge them from crack and cranny.

The air is full of flying insects, and to take care of these there are the swallows, swifts, and nighthawks, whose wings and bodies are so shaped as to endow them with the speed and agility necessary to follow all the turns and windings of their nimble insect prey.

The whip-poor-wills, swift of wing and with capacious mouths beset with bristles, attend to the night-flying insects when most birds are asleep, while the hawks by day and the owls by night supplement the work of other birds and have a special function of their own, the destruction of noxious rodents.

Thus every family of birds plays its own part in the warfare against insects and other foes to man's industry, and contributes its share to man's welfare.

Birds would fall far short of what they accomplish for man were they not the most active of living things. It is curious that the group of vertebrates which live the fastest—that is, have a higher temperature and a more rapid circulation than any other—should be related by descent to a family of such cold-blooded creatures as the reptiles and lizards, which often go without food and hibernate for considerable periods. Very different is it with birds. Few realize the enormous quantity of food required to sustain the energy of these creatures, most of whose waking hours are spent in a never-ending search for food.

BIRDS CHECK RAVAGES OF DISEASE-CARRYING INSECTS

In satisfying their own hunger birds perform an important service to man, for notwithstanding the fact that the acreage

under cultivation in the United States is larger than ever before, and that the crops are greater, the cost of foodstuffs continually mounts upward. Meanwhile the destruction of farm and orchard crops by insects and by rodents amounts to many millions each year, and if any part of this loss can be prevented it will be so much clear gain.

The protection of insectivorous and rodent-destroying birds is one of the most effective means of preventing much of this unnecessary loss, and the public is rapidly awakening to the importance of this form of conservation. From the farmers' standpoint, such birds as the bobwhite, prairie-chicken, the upland plover, and the other shore birds are worth very much more as insect eaters than as food or as objects of pursuit by the sportsman. This statement applies with especial force to such species as the prairie-chicken, which everywhere in its old haunts is threatened with extinction.

The value of birds to the farmer is plain enough, but we do not usually think of birds as having any direct relation to the public health. To prove that they do, however, it is only necessary to state that 500 mosquitoes have been found in the stomach of a single nighthawk; that in a killdeer's stomach hundreds of the larvæ of the salt-marsh mosquito have been found, and that many shore birds greedily devour mosquito larvæ.

As mosquitoes are known to carry the germs of such serious diseases as dengue fever and malaria, it is evident that by destroying them birds are conferring an important benefit on man. It may be added that not infrequently ticks are eaten by birds, and that the tick responsible for the spread of Texas fever among cattle has been found in the stomach of the bobwhite.

Since birds perform such invaluable service, every effort should be made to protect the birds we now have and to increase their numbers. This can be done in several ways: (*a*) by furnishing nesting boxes for certain species, as swallows, martins, wrens, woodpeckers, great-crested flycatchers, and others; (*b*) by planting berry-bearing shrubs about the farm or orchard as food for the birds in winter; (*c*) by the establishment of bird sanctuaries, where birds may be reasonably safe from their natural enemies and be permitted to live and breed in absolute security as far as man is concerned.

Here, again, the National Government, taking the lead, has set apart no less than 64 bird refuges in various parts of the United States. These for the most part are rocky, barren islands of little or no agricultural value, but of very great usefulness in the cause of bird protection. The example thus set is now being followed by certain States, as Oregon and Wisconsin. Several private citizens also have acquired islands for the purpose of making bird preserves of them; others not only prevent the destruction of wild life on their forested estates, but go much farther, and endeavor in various ways to increase the number of their bird tenants.

Efforts to protect birds on a smaller scale and to attract them about dwellings, with a view to their close companionship, are worthy of all praise, and such efforts should be far more common in this country than they are at present, particularly as the means involve little trouble or expense. The presence of trees and shrubbery near the house is of itself an open invitation to birds which they are eager to accept, particularly if the shrubbery is not too closely pruned. Birds like thick vines and tangles, in the recesses of which they feel safe from their many enemies. Suet, nuts, and other bird foods, if exposed in conspicuous places, can usually be depended on to attract birds in winter, and often avail to save many lives, especially when snow covers the ground.

Species which are not berry eaters, like the woodpeckers, nuthatches, creepers, and chickadees, can be made winter residents of many farms, even in the North, by putting out at convenient places a supply of suet, of which they and many other birds are very fond, even in summer. Hedges and thickets about the farm are important to furnish nesting sites and shelter both from the elements and from the numerous enemies of birds.

Few are aware of the difficulty often experienced by birds in obtaining water for drinking and bathing, and a constant supply of water near the farmhouse will materially aid in attracting birds to the neighborhood and in keeping them there.

at least till the time of migration. Shallow trays of wood or metal admirably serve the purpose, especially as birds delight to bathe in them.

BIRDS SHOULD EVERYWHERE BE PROTECTED

By supplying artificial nest-boxes the number of birds may be increased around farms and orchards where their services are most needed. The average farmer's boy, if provided with a few tools, is quite equal to the task of making acceptable boxes for martins, swallows, bluebirds, wrens, woodpeckers, and other species, which are far from fastidious as to the appearance of the box intended for their occupancy.

Entomologists have estimated that insects yearly cause a loss of upward of $700,000,000 to the agricultural interests of the United States. Were it not for our birds the loss would be very much greater, and, indeed, it is believed that without the aid of our feathered friends successful agriculture would be impossible.

A knowledge of the birds that protect his crops is, therefore, as important to the farmer as a knowledge of the insect pests that destroy them. Such information is the more needful because the relation of birds to man's interests is extremely complex.

Thus, while it may be said that most of our birds are useful, there are only a few of them that are always and everywhere useful and that never do harm. Insectivorous birds, for instance, destroy, along with a vast number of harmful insects, some parasitic and predatory kinds. These latter are among Nature's most effective agents for keeping destructive insects in check. To the extent, then, that birds destroy useful parasitic insects, they are harmful; but, taking the year round, the good they do by the destruction of insects injurious to man's interests far outweighs the little harm they do.

It may be said, too, that of the birds usually classed as noxious there are very few that do not possess redeeming traits. Thus the crow is mischievous in spring and sorely taxes the farmer's patience and ingenuity to prevent him from pulling up the newly planted corn. Moreover, the crow destroys the eggs and young of useful insectivorous and game birds; but, on the other hand, he eats many insects, especially white grubs and cut-worms, and destroys many meadow mice; so that in much (although not all) of the region he inhabits the crow must be considered to be more useful than harmful.

THEIR WINGS ENABLE BIRDS TO ACT EFFICIENTLY AS POLICEMEN

Most of the hawks and owls even—birds that have received so bad a name that the farmer's boy and the sportsman are ever on the alert to kill them—are very useful because they destroy vast numbers of insects and harmful rodents.

Birds occupy a unique position among the enemies of insects, since their powers of flight enable them at short notice to gather at points where there are abnormal insect outbreaks. An unusual abundance of grasshoppers, for instance, in a given locality soon attracts the birds from a wide area, and as a rule their visits cease only when there are no grasshoppers left. So also a marked increase in the number of small rodents in a given neighborhood speedily attracts the attention of hawks and owls, which, by reason of their voracious appetites, soon produce a marked diminution of the swarming foe.

One of the most useful groups of native birds is the sparrow family. While some of the tribe wear gay suits of many hues, most of the sparrows are clad in modest brown tints, and as they spend much of the time in grass and weeds are commonly overlooked. Unobtrusive as they are, they lay the farmer under a heavy debt of gratitude by their food habits, since their chosen fare consists largely of the seeds of weeds. Selecting a typical member of the group, the tree sparrow, for instance, one-fourth ounce of weed seed per day is a conservative estimate of the food of an adult.

On this basis, in a large agricultural State like Iowa tree sparrows annually eat approximately 875 tons of weed seeds. Only the farmer, upon whose shoulders falls the heavy burden of freeing his land of noxious weeds, can realize what this vast consumption of weed seeds means in the saving and cost of labor.

Some idea of the money value of this group of birds to the country may be gained from the statement that the total value of the farm products in the United States in 1915 reached the amazing sum of $9,108,000,000. If we estimate that the total consumption of weed seed by the combined members of the sparrow family resulted in a saving of only 1 per cent of the crops—not a violent assumption—the sum saved to farmers by these birds in 1915 was $91,080,000.

MOST HAWKS AND OWLS BENEFICIAL

The current idea in relation to hawks and owls is erroneous. These birds are generally classed as thieves and robbers, whereas a large majority of them are the farmers' friends and spend the greater part of their long lives in pursuit of injurious insects and rodents. The hawks work by day, the owls chiefly by night; so that the useful activities of the two classes are continued practically throughout the 24 hours.

As many as 100 grasshoppers have been found in the stomach of a Swainson's hawk, representing a single meal; and in the retreat of a pair of barn owls have been found more than 3,000 skulls, 97 per cent of which were of mammals, the bulk consisting of field mice, house mice, and common rats. Nearly half a bushel of the remains of pocket gophers—animals which are very destructive in certain parts of the United States—was found near a nest of this species. The notable increase of noxious rodents during the last few years in certain parts of the United States and the consequent damage to crops are due in no small part to the diminished number of birds of prey, which formerly destroyed them and materially aided in keeping down their numbers.

A few hawks are injurious, and the bulk of the depredations on birds and chickens chargeable against hawks is committed by three species—the Cooper's hawk, the sharp-shinned hawk, and the goshawk. The farmer's boy should learn to know these daring robbers by sight, so as to kill them whenever possible.

From the foregoing it will at once appear that the practice of offering bounties indiscriminately for the heads of hawks and owls, as has been done by some States, is a serious mistake, the result being not only a waste of public funds, but the destruction of valuable servants which can be replaced, if at all, only after the lapse of years.

As a rule, birds do not live very long, but, as previously stated, they live fast. They breathe rapidly and have a higher temperature and a more rapid circulation than other vertebrates. This is a fortunate circumstance, since to generate the requisite force to sustain their active bodies a large quantity of food is necessary, and as a matter of fact birds have to devote most of their waking hours to obtaining insects, seeds, berries, and other kinds of food.

The activity of birds in the pursuit of insects is still further stimulated by the fact that the young of most species, even those which are by no means strictly insectivorous, require great quantities of animal food in the early weeks of existence, so that during the summer months—the flood time of insect life—birds are compelled to redouble their attacks on our insect foes to satisfy the wants of their clamorous young.

Field observations of the food habits of birds serve a useful purpose, but they are rarely accurate enough to be fully reliable. The presence of certain birds in a corn or wheat field or in an orchard is by no means proof, as is too often assumed, that they are devastating the grain or fruit. They may have been attracted by insects which, unknown to the farmer or orchardist, are fast ruining his crop. Hence it has been found necessary to examine the stomachs and crops of birds to ascertain definitely what and how much they eat.

ASTONISHING CAPACITY OF BIRDS' STOMACHS REVEALED BY 50,000 TESTS

The Biological Survey has in this way examined upward of 50,000 birds, most of which have been obtained during the last 25 years from scientific collectors, for our birds are too useful to be sacrificed when it can possibly be avoided, even for the sake of obtaining data upon which to base legislation for their protection.

It is interesting to observe that hungry birds—and birds are hungry most of the



MAP SHOWING THE BIRD ZONES

With their unparalleled facilities for locomotion over both land and water, birds are more widely distributed than any other vertebrates, yet their comparatively delicate organizations are highly sensitive to many conditions of life. The most important factor in determining the breeding range of birds is, of course, the one of climate, expressed mainly through temperature and to a lesser degree through rainfall.

The zone map shows that North America is divided into three great regions—the Boreal, Austral, and Tropical—and the first two in turn are subdivided into three zones each. The boundaries of the zones follow in a general way certain isotherms, or lines of temperature, with subdivisions determined by the annual rainfall. The numerous "lakes" and "islands" noted on the zone map are brought about in most cases by the altitude of these areas.

In connection with this map it is well to keep in mind C. Hart Merriam's Laws of Temperature Control: First, "Animals and plants are restricted in northward distribution by the total quantity of heat during the season of growth and reproduction." Second, "Animals and plants are restricted southward in distribution by the mean temperature of a brief period covering the hottest part of the year." With respect to birds the reference in both instances is to the *breeding* range.

time—are not content to fill their stomachs with insects or seeds, but after the stomach is stuffed until it will hold no more continue to eat till the crop or gullet also is crammed. It is often the case that when the stomach is opened and the contents piled up the pile is two or three times as large as the stomach was when filled. Birds may truly be said to have healthy appetites. To show the astonishing capacity of birds' stomachs and to reveal the extent to which man is indebted to birds for the destruction of noxious insects, the following facts are given as learned by stomach examinations made by assistants of the Biological Survey:

A tree swallow's stomach was found to contain 40 entire chinch-bugs and fragments of many others, besides 10 other species of insects. A bank swallow in Texas devoured 68 cotton-boll weevils, one of the worst insect pests that ever invaded the United States; and 35 cliff swallows had taken an average of 18 boll weevils each. Two stomachs of pine siskins from Haywards, Cal., contained 1,900 black olive scales and 300 plant lice. A killdeer's stomach taken in November in Texas contained over 300 mosquito larvæ.

A flicker's stomach held 28 white grubs. A nighthawk's stomach collected in Kentucky contained 34 May beetles, the adult form of white grubs. Another nighthawk, from New York, had eaten 24 clover-leaf weevils and 375 ants. Still another nighthawk had eaten 340 grasshoppers, 52 bugs, 3 beetles, 2 wasps, and a spider. A boat-tailed grackle from Texas had eaten at one meal about 100 cotton bollworms, besides a few other insects. A ring-necked pheasant's crop from Washington contained 8,000 seeds of chickweed and a dandelion head. More than 72,000 seeds have been found in a single duck stomach taken in Louisiana in February.

A knowledge of his bird friends and enemies, therefore, is doubly important to the farmer and orchardist in order that he may protect the kinds that earn protection by their services and may drive away or destroy the others. At the present time many kinds of useful birds need direct intervention in their behalf as never before. The encroachments of civilization on timbered tracts and the methods of modern intensive cultivation by destroying or restricting breeding grounds of birds tend to diminish their ranks. The number of insect pests, on the other hand, is all the time increasing by leaps and bounds through importations from abroad and by migration from adjoining territories. Every effort, therefore, should be made to augment the numbers of our useful birds by protecting them from their enemies, by providing nesting facilities, and by furnishing them food in times of stress.

One of the worst foes of our native birds is the house cat, and probably none of our native wild animals destroys as many birds on the farm, particularly fledglings, as cats. The household pet is by no means blameless in this respect, for the bird-hunting instinct is strong, even in the well-fed tabby; but much of the loss of our feathered life is attributable to the half-starved stray, which in summer is as much at home in the groves and fields as the birds themselves. Forced to forage for their own livelihood, these animals, which are almost as wild as the ancestral wildcat, inflict an appalling loss on our feathered allies, and even on the smaller game birds, like the woodcock and bobwhite. If cats are to find place in the farmer's household, every effort should be made by carefully feeding and watching them to insure the safety of the birds. The cat without a home should be mercifully put out of the way.

In the following pages our commoner birds are discussed, including some that are destructive. They inhabit various parts of the country, and it is to the interest of the farmers of the respective localities to be familiar with them.

A colored illustration of each species by the well-known artist, Louis Agassiz Fuertes, is given, so as to enable the reader to identify the bird at a glance and to permit the descriptive text, at best an unsatisfactory method of identification, to be cut down or altogether dispensed with. The accounts of the birds' habits are necessarily brief, but they are believed to be sufficient to acquaint the reader with the most prominent characteristic of the several species, at least from the standpoint of their relation to man.

BLUEBIRD (Sialia sialis)

Length,* about 6½ inches.

Range: Breeds in the United States (west to Arizona, Colorado, Wyoming, and Montana), southern Canada, Mexico, and Guatemala; winters in the southern half of the eastern United States and south to Guatemala.

Habits and economic status: The bluebird is one of the most familiar tenants of the farm and dooryard. Everywhere it is hailed as the harbinger of spring, and wherever it chooses to reside it is sure of a warm welcome. This bird, like the robin, phœbe, house wren, and some swallows, is very domestic in its habits. Its favorite nesting sites are crannies in the farm buildings or boxes made for its use or natural cavities in old apple trees. For rent the bird pays amply by destroying insects, and it takes no toll from the farm crop. The bluebird's diet consists of 68 per cent of insects to 32 per cent of vegetable matter. The largest items of insect food are grasshoppers first and beetles next, while caterpillars stand third. All of these are harmful except a few of the beetles. The vegetable food consists chiefly of fruit pulp, only an insignificant portion of which is of cultivated varieties. Among wild fruits elderberries are the favorite. From the above it will be seen that the bluebird does no essential harm, but on the contrary eats many harmful and annoying insects. (See Farmers' Bul. 54, pp. 46-48.)

*Measured from tip of bill to tip of tail.

ROBIN (Planesticus migratorius)

Length, 10 inches.

Range: Breeds in the United States (except the Gulf States), Canada, Alaska, and Mexico; winters in most of the United States and south to Guatemala.

Habits and economic status: In the North and some parts of the West the robin is among the most cherished of our native birds. Should it ever become rare where now common, its joyous summer song and familiar presence will be sadly missed in many a homestead. The robin is an omnivorous feeder, and its food includes many orders of insects, with no very pronounced preference for any. It is very fond of earthworms, but its real economic status is determined by the vegetable food, which amounts to about 58 per cent of all. The principal item is fruit, which forms more than 51 per cent of the total food. The fact that in the examination of over 1,200 stomachs the percentage of wild fruit was found to be five times that of the cultivated varieties suggests that berry-bearing shrubs, if planted near the orchard, will serve to protect more valuable fruits. In California in certain years it has been possible to save the olive crop from hungry robins only by the most strenuous exertions and considerable expense. The bird's general usefulness is such, however, that all reasonable means of protecting orchard fruit should be tried before killing the birds. (See Farmers' Bul. 54, pp. 44-46.)

RUSSET-BACKED THRUSH (Hylocichla ustulata)

Length, 7¼ inches. Among thrushes having the top of head and tail nearly the same color as the back, this one is distinguished by its tawny eye-ring and cheeks. The Pacific coast subspecies is russet brown above, while the other subspecies is the olive-backed thrush. The remarks below apply to the species as a whole.

Range: Breeds in the forested parts of Alaska and Canada and south to California, Colorado, Michigan, New York, West Virginia (mountains), and Maine; winters from Mexico to South America.

Habits and economic status: This is one of a small group of thrushes the members of which are by many ranked first among American song birds. The several members resemble one another in size, plumage, and habits. While this thrush is very fond of fruit, its partiality for the neighborhood of streams keeps it from frequenting orchards far from water. It is most troublesome during the cherry season, when the young are in the nest. From this it might be inferred that the young are fed on fruit, but such is not the case. The adults eat fruit, but the nestlings, as usual, are fed mostly upon insects. Beetles constitute the largest item of animal food, and ants come next. Many caterpillars also are eaten. The great bulk of vegetable food consists of fruit, of which two-fifths are of cultivated varieties. (See Biol. Surv. Bul. 30, pp. 86-92.)

RUBY-CROWNED KINGLET (Regulus calendula)

Length, about 4¼ inches. Olive green above, soiled whitish below, concealed feathers on head (crest) bright red.

Range: Breeds in southern Canada, southern Alaska, and the higher mountains of the western United States; winters in much of the United States and south to Guatemala.

Habits and economic status: In habits and haunts this tiny sprite resembles a chickadee. It is an active, nervous little creature, flitting hither and yon in search of food, and in spring stopping only long enough to utter its beautiful song, surprisingly loud for the size of the musician. Three-fourths of its food consists of wasps, bugs, and flies. Beetles are the only other item of importance (12 per cent). The bugs eaten by the kinglet are mostly small, but, happily, they are the most harmful kinds. Tree-hoppers, leaf-hoppers, and jumping plant lice are pests and often do great harm to trees and smaller plants, while plant lice and scale insects are the worst scourges of the fruit grower; in fact, the prevalence of the latter has almost risen to the magnitude of a national peril. It is these small and seemingly insignificant birds that most successfully attack and hold in check these insidious foes of horticulture. The vegetable food consists of seeds of poison ivy, or poison oak, a few weed seeds, and a few small fruits, mostly elderberries. (See Biol. Surv. Bul. 30, pp. 81-84.)









Bluebird
Russet-backed Thrush

Robin
Ruby-crowned Kinglet

CHICKADEE (Penthestes atricapillus)

Length, about 5¼ inches.

Range: Resident in the United States (except the southern half east of the plains), Canada, and Alaska.

Habits and economic status: Because of its delightful notes, its confiding ways, and its fearlessness, the chickadee is one of our best-known birds. It responds to encouragement, and by hanging within its reach a constant supply of suet the chickadee can be made a regular visitor to the garden and orchard. Though insignificant in size, titmice are far from being so from the economic standpoint, owing to their numbers and activity. While one locality is being scrutinized for food by a larger bird, 10 are being searched by the smaller species. The chickadee's food is made up of insects and vegetable matter in the proportion of 7 of the former to 3 of the latter. Moths and caterpillars are favorites and form about one-third of the whole. Beetles, ants, wasps, bugs, flies, grasshoppers, and spiders make up the rest. The vegetable food is composed of seeds, largely those of pines, with a few of the poison ivy and some weeds. There are few more useful birds than the chickadees.

WHITE-BREASTED NUTHATCH (Sitta carolinensis)

Length, 6 inches. White below, above gray, with a black head.

Range: Resident in the United States, southern Canada, and Mexico.

Habits and economic status: This bird might readily be mistaken by a careless observer for a small woodpecker, but its note, an oft-repeated *yank*, is very unwoodpecker-like, and, unlike either woodpeckers or creepers, it climbs downward as easily as upward and seems to set the laws of gravity at defiance. The name was suggested by the habit of wedging nuts, especially beechnuts, in the crevices of bark so as to break them open by blows from the sharp, strong bill. The nuthatch gets its living from the trunks and branches of trees, over which it creeps from daylight to dark. Insects and spiders constitute a little more than 50 per cent of its food. The largest items of these are beetles, moths, and caterpillars, with ants and wasps. The animal food is all in the bird's favor except a few ladybird beetles. More than half of the vegetable food consists of mast—that is, acorns and other nuts or large seeds. One-tenth of the food is grain, mostly waste corn. The nuthatch does no injury, so far as known, and much good.

BROWN CREEPER (Certhia familiaris americana and other subspecies)

Length, 5½ inches.

Range: Breeds from Nebraska, Indiana, North Carolina (mountains), and Massachusetts north to southern Canada, also in the mountains of the western United States, north to Alaska, south to Nicaragua; winters over most of its range.

Habits and economic status: Rarely indeed is the creeper seen at rest. It appears to spend its life in an incessant scramble over the trunks and branches of trees, from which it gets all its food. It is protectively colored so as to be practically invisible to its enemies and, though delicately built, possesses amazingly strong claws and feet. Its tiny eyes are sharp enough to detect insects so small that most other species pass them by, and altogether the creeper fills a unique place in the ranks of our insect destroyers. The food consists of minute insects and insects' eggs, also cocoons of tineid moths, small wasps, ants, and bugs, especially scales and plant lice, with some small caterpillars. As the creeper remains in the United States throughout the year, it naturally secures hibernating insects and insects' eggs, as well as spiders and spiders' eggs, that are missed by the summer birds. On its bill of fare we find no product of husbandry nor any useful insects.

HOUSE WREN (Troglodytes aëdon)

Length, 4¾ inches. The only one of our wrens with wholly whitish underparts that lacks a light line over the eye.

Range: Breeds throughout the United States (except the South Atlantic and Gulf States) and southern Canada; winters in the southern United States and Mexico.

Habits and economic status: The rich, bubbling song of the familiar little house wren is one of the sweetest associations connected with country and suburban life. Its tiny body, long bill, sharp eyes, and strong feet peculiarly adapt it for creeping into all sorts of nooks and crannies where lurk the insects it feeds on. A cavity in a fence post, a hole in a tree, or a box will be welcomed alike by this busybody as a nesting site; but since the advent of the quarrelsome English sparrows such domiciles are at a premium and the wren's eggs and family are safe only in cavities having entrances too small to admit the sparrow. Hence it behooves the farmer's boy to provide boxes the entrances to which are about an inch in diameter, nailing these under gables of barns and outhouses or in orchard trees. In this way the numbers of this useful bird can be increased, greatly to the advantage of the farmer. Grasshoppers, beetles, caterpillars, bugs, and spiders are the principal elements of its food. Cutworms, weevils, ticks, and plant lice are among the injurious forms eaten. The nestlings of house wrens consume great quantities of insects.









Chickadee
Brown Creeper

White-breasted Nuthatch
House Wren

CATBIRD (Dumetella carolinensis)

Length, about 9 inches. The slaty gray plumage and black cap and tail are distinctive.

Range: Breeds throughout the United States west to New Mexico, Utah, Oregon, and Washington, and in southern Canada; winters from the Gulf States to Panama.

Habits and economic status: In many localities the catbird is one of the commonest birds. Tangled growths are its favorite nesting places and retreats, but berry patches and ornamental shrubbery are not disdained. Hence the bird is a familiar dooryard visitor. The bird has a fine song, unfortunately marred by occasional cat calls. With habits similar to those of the mocking bird and a song almost as varied, the catbird has never secured a similar place in popular favor. Half of its food consists of fruit, and the cultivated crops most often injured are cherries, strawberries, raspberries, and blackberries. Beetles, ants, crickets, and grasshoppers are the most important element of its animal food. The bird is known to attack a few pests, as cutworms, leaf beetles, clover-root curculio, and the periodical cicada; but the good it does in this way probably does not pay for the fruit it steals. The extent to which it should be protected may perhaps be left to the individual cultivator—that is, it should be made lawful to destroy catbirds that are doing manifest damage to crops.

LOGGERHEAD SHRIKE (Lanius ludovicianus)

Length, about 9 inches. A gray, black, and white bird, distinguished from the somewhat similarly colored mocking bird by the black stripe on side of head.

Range: Breeds throughout the United States, Mexico, and southern Canada; winters in the southern half of the United States and in Mexico.

Habits and economic status: The loggerhead shrike, or southern butcher bird, is common throughout its range and is sometimes called "French mocking bird" from a superficial resemblance and not from its notes, which are harsh and unmusical. The shrike is naturally an insectivorous bird which has extended its bill of fare to include small mammals, birds, and reptiles. Its hooked beak is well adapted to tearing its prey, while to make amends for the lack of talons it has hit upon the plan of forcing its victim, if too large to swallow, into the fork of a bush or tree, where it can tear it asunder. Insects, especially grasshoppers, constitute the larger part of its food, though beetles, moths, caterpillars, ants, wasps, and a few spiders also are taken. While the butcher bird occasionally catches small birds, its principal vertebrate food is small mammals, as field mice, shrews, and moles, and when possible it obtains lizards. It habitually impales its surplus prey on a thorn, sharp twig, or barb of a wire fence.

MYRTLE WARBLER (Dendroica coronata)

Length, 5½ inches. The similarly colored Audubon's warbler has a yellow throat instead of a white one. (See page 85.)

Range: Breeds throughout most of the forested area of Canada and south to Minnesota, Michigan, New York, and Massachusetts; winters in the southern two-thirds of the United States and south to Panama.

Habits and economic status: This member of our beautiful wood-warbler family—a family peculiar to America—has the characteristic voice, coloration, and habits of its kind. Trim of form and graceful of motion, when seeking food it combines the methods of the wrens, creepers, and flycatchers. It breeds only in the northern parts of the eastern United States, but in migration it occurs in every patch of woodland and is so numerous that it is familiar to every observer. Its place is taken in the West by Audubon's warbler. More than three-fourths of the food of the myrtle warbler consists of insects, practically all of them harmful. It is made up of small beetles, including some weevils, with many ants and wasps. This bird is so small and nimble that it successfully attacks insects too minute to be prey for larger birds. Scales and plant lice form a very considerable part of its diet. Flies are the largest item of food; in fact, only a few flycatchers and swallows eat as many flies as this bird. The vegetable food (22 per cent) is made up of fruit and the seeds of poison oak or ivy; also the seeds of pine and of the bayberry.

BARN SWALLOW (Hirundo erythrogastra)

Length, about 7 inches. Distinguished among our swallows by deeply forked tail.

Range: Breeds throughout the United States (except the South Atlantic and Gulf States) and most of Canada; winters in South America.

Habits and economic status: This is one of the most familiar birds of the farm and one of the greatest insect destroyers. From daylight to dark on tireless wings it seeks its prey, and the insects destroyed are countless. Its favorite nesting site is a barn rafter, upon which it sticks its mud basket. Most modern barns are so tightly constructed that swallows cannot gain entrance, and in New England and some other parts of the country barn swallows are much less numerous than formerly. Farmers can easily provide for the entrance and exit of the birds and so add materially to their numbers. It may be well to add that the parasites that sometimes infest the nests of swallows are not the ones the careful housewife dreads, and no fear need be felt of the infestation spreading to the houses. Insects taken on the wing constitute the almost exclusive diet of the barn swallow. More than one-third of the whole consists of flies. Beetles stand next in order and consist of many of the small dung beetles of the May-beetle family that swarm over the pastures in the late afternoon.









Catbird
Loggerhead Shrike

Myrtle Warbler
Barn Swallow

PURPLE MARTIN (Progne subis)

Length, about 8 inches.

Range: Breeds throughout the United States and southern Canada, south to central Mexico; winters in South America.

Habits and economic status: This is the largest, as it is one of the most beautiful, of the swallow tribe. It formerly built its nests in cavities of trees, as it still does in wild districts, but learning that man was a friend it soon adopted domestic habits. Its presence about the farm can often be secured by erecting houses suitable for nesting sites and protecting them from usurpation by the English sparrow, and every effort should be made to increase the number of colonies of this very useful bird. The boxes should be at a reasonable height, say 15 feet from the ground, and made inaccessible to cats. A colony of these birds on a farm makes great inroads upon the insect population, as the birds not only themselves feed upon insects, but rear their young upon the same diet. Fifty years ago in New England it was not uncommon to see colonies of 50 pairs of martins; but most of them have now vanished for no apparent reason except that the martin houses have decayed and have not been renewed. More than three-fourths of this bird's food consists of wasps, bugs, and beetles, their importance being in the order given. The beetles include several species of harmful weevils, as the clover-leaf weevils and the nut weevils. Besides these are many crane flies, moths, May flies, and dragonflies.

ROSE-BREASTED GROSBEAK (Zamelodia ludoviciana)

Length, 8 inches.

Range: Breeds from Kansas, Ohio, Georgia (mountains), and New Jersey, north to southern Canada; winters from Mexico to South America.

Habits and economic status: This beautiful grosbeak is noted for its clear, melodious notes, which are poured forth in generous measure. The rosebreast sings even at midday during summer, when the intense heat has silenced almost every other songster. Its beautiful plumage and sweet song are not its sole claim on our favor, for few birds are more beneficial to agriculture. The rosebreast eats some green peas and does some damage to fruit. But this mischief is much more than balanced by the destruction of insect pests. The bird is so fond of the Colorado potato beetle that it has earned the name of "potato-bug bird," and no less than a tenth of the total food of the rosebreasts examined consists of potato beetles—evidence that the bird is one of the most important enemies of the pest. It vigorously attacks cucumber beetles and many of the scale insects. It proved an active enemy of the Rocky Mountain locust during that insect's ruinous invasions, and among the other pests it consumes are the spring and fall cankerworms, orchard and forest tent caterpillars, tussock, gipsy, and brown-tail moths, plum curculio, army worm, and chinch bug. In fact, not one of our birds has a better record.

BLACK-HEADED GROSBEAK (Zamelodia melanocephala)

Length, about 8¼ inches.

Range: Breeds from the Pacific coast to Nebraska and the Dakotas, and from southern Canada to southern Mexico; winters in Mexico.

Habits and economic status: The black-headed grosbeak takes the place in the West of the rosebreast in the East, and, like it, is a fine songster. Like it, also, the blackhead readily resorts to orchards and gardens and is common in agricultural districts. The bird has a very powerful bill and easily crushes or cuts into the firmest fruit. It feeds upon cherries, apricots, and other fruits, and also does some damage to green peas and beans; but it is so active a foe of certain horticultural pests that we can afford to overlook its faults. Several kinds of scale insects are freely eaten, and one, the black olive scale, constitutes a fifth of the total food. In May many cankerworms and codling moths are consumed, and almost a sixth of the bird's seasonal food consists of flower beetles, which do incalculable damage to cultivated flowers and to ripe fruit. For each quart of fruit consumed by the black-headed grosbeak it destroys in actual bulk more than 1½ quarts of black olive scales and one quart of flower beetles besides a generous quantity of codling-moth pupæ and cankerworms. It is obvious that such work as this pays many times over for the fruit destroyed.

SONG SPARROW (Melospiza melodia)

Length, about 6¼ inches. The heavily spotted breast with heavy central blotch is characteristic.

Range: Breeds in the United States (except the South Atlantic and Gulf States), southern Canada, southern Alaska, and Mexico; winters in Alaska and most of the United States southward.

Habits and economic status: Like the familiar little "chippy," the song sparrow is one of our most domestic species, and builds its nest in hedges or in garden shrubbery close to houses, whenever it is reasonably safe from the house cat, which, however, takes heavy toll of the nestlings. It is a true harbinger of spring, and its delightful little song is trilled forth from the top of some green shrub in early March and April, before most of our other songsters have thought of leaving the sunny South. Song sparrows vary much in habits, as well as in size and coloration. Some forms live along streams bordered by deserts, others in swamps among bulrushes and tules, others in timbered regions, others on rocky barren hillsides, and still others in rich, fertile valleys. With such a variety of habitat, the food of the species naturally varies considerably. About three-fourths of its diet consists of the seeds of noxious weeds and one-fourth of insects. Of these, beetles, especially weevils, constitute the major portion. Ants, wasps, bugs (including the black olive scale), and caterpillars are also eaten. Grasshoppers are taken by the eastern birds, but not by the western ones.









Purple Martin
Rose-breasted Grosbeak

Black-throated Grosbeak
Song Sparrow

CHIPPING SPARROW (Spizella passerina)

Length, about 5¼ inches. Distinguished by the chestnut crown, black line through eye, and black bill.

Range: Breeds throughout the United States, south to Nicaragua, and north to southern Canada; winters in the southern United States and southward.

Habits and economic status: The chipping sparrow is very friendly and domestic, and often builds its nest in gardens and orchards or in the shrubbery close to dwellings. Its gentle and confiding ways endear it to all bird lovers. It is one of the most insectivorous of all the sparrows. Its diet consists of about 42 per cent of insects and spiders and 58 per cent of vegetable matter. The animal food consists largely of caterpillars, of which it feeds a great many to its young. Besides these, it eats beetles, including many weevils, of which one stomach contained 30. It also eats ants, wasps, and bugs. Among the latter are plant lice and black olive scales. The vegetable food is practically all weed seed. A nest with 4 young of this species was watched at different hours on 4 days. In the 7 hours of observation 119 feedings were noted, or an average of 17 feedings per hour, or 4¼ feedings per hour to each nestling. This would give for a day of 14 hours at least 238 insects eaten by the brood.

ENGLISH SPARROW (Passer domesticus)

Length, about 6¼ inches. Its incessant chattering, quarrelsome disposition, and abundance and familiarity about human habitations distinguish it from our native sparrows.

Range: Resident throughout the United States and southern Canada.

Habits and economic status: Almost universally condemned since its introduction into the United States, the English sparrow has not only held its own, but has ever increased in numbers and extended its range in spite of all opposition. Its habit of driving out or even killing more beneficial species and the defiling of buildings by its droppings and by its own unsightly structures are serious objections to this sparrow. Moreover, in rural districts, it is destructive to grain, fruit, peas, beans, and other vegetables. On the other hand, the bird feeds to some extent on a large number of insect pests, and this fact points to the need of a new investigation of the present economic status of the species, especially as it promises to be of service in holding in check the newly introduced alfalfa weevil, which threatens the alfalfa industry in Utah and neighboring States. In cities most of the food of the English sparrow is waste material secured from the streets.

WHITE-CROWNED SPARROW (Zonotrichia leucophrys)

Length, 7 inches. The only similar sparrow, the white throat, has a yellow spot in front of eye.

Range: Breeds in Canada, the mountains of New Mexico, Colorado, Wyoming, and Montana, and thence to the Pacific coast; winters in the southern half of the United States and in northern Mexico.

Habits and economic status: This beautiful sparrow is much more numerous in the western than in the eastern States, where, indeed, it is rather rare. In the East it is shy and retiring, but it is much bolder and more conspicuous in the far West, and there often frequents gardens and parks. Like most of its family, it is a seed eater by preference, and insects comprise very little more than 7 per cent of its diet. Caterpillars are the largest item, with some beetles, a few ants and wasps, and some bugs, among which are black olive scales. The great bulk of the food, however, consists of weed seeds, which amount to 74 per cent of the whole. In California this bird is accused of eating the buds and blossoms of fruit trees, but buds or blossoms were found in only 30 out of 516 stomachs, and probably it is only under exceptional circumstances that it does any damage in this way. Evidently neither the farmer nor the fruit grower has much to fear from the white-crowned sparrow. The little fruit it eats is mostly wild, and the grain eaten is waste or volunteer.

CROW BLACKBIRD (Quiscalus quiscula)

Length, 12 inches. Shorter by at least 3 inches than the other grackles with trough-shaped tails. Black, with purplish, bluish, and bronze reflections.

Range: Breeds throughout the United States west to Texas, Colorado, and Montana, and in southern Canada; winters in the southern half of the breeding range.

Habits and economic status: This blackbird is a beautiful species, and is well known from its habit of congregating in city parks and nesting there year after year. Like other species which habitually assemble in great flocks, it is capable of inflicting much damage on any crop it attacks, and where it is harmful a judicious reduction of numbers is probably sound policy.

It shares with the crow and blue jay the evil habit of pillaging the nests of small birds of eggs and young. Nevertheless it does much good by destroying insect pests, especially white grubs, weevils, grasshoppers, and caterpillars. Among the caterpillars are army worms and other cutworms. When blackbirds gather in large flocks, as in the Mississippi Valley, they may greatly damage grain, either when first sown or when in the milk. In winter they subsist mostly on weed seed and waste grain.







CHIPPING SPARROW
WHITE-CROWNED SPARROW



ENGLISH SPARROW
CROW BLACKBIRD

HORNED LARK (Otocoris alpestris)

Length, about 7¾ inches. The black mark across the breast and the small, pointed tufts of dark feathers above and behind the eyes distinguish the bird.

Range: Breeds throughout the United States (except the South Atlantic and Gulf States) and Canada; winters in all the United States except Florida.

Habits and economic status: Horned larks frequent the open country, especially the plains and deserts. They associate in large flocks, are hardy, apparently delighting in exposed situations in winter, and often nest before snow disappears. The flight is irregular and hesitating, but in the breeding season the males ascend high in air, singing as they go, and pitch to the ground in one thrilling dive. The preference of horned larks is for vegetable food, and about one-sixth of this is grain, chiefly waste. Some sprouting grain is pulled, but drilled grain is safe from injury. California horned larks take much more grain than the eastern birds, specializing on oats, but this is accounted for by the fact that oats grow wild over much of the State. Weed seeds are the largest single element of food. The insect food, about 20 per cent of the whole, includes such pests as May beetles and their larvæ (white grubs), leaf beetles, clover-leaf and clover-root weevils, the potato-stalk borer, nut weevils, bill-bugs, and the chinch-bug. Grasshoppers are a favorite food and cutworms are freely eaten. The horned larks, on the whole, may be considered useful birds.

KINGBIRD (Tyrannus tyrannus)

Length, about 8½ inches. The white lower surface and white-tipped tail distinguish this flycatcher.

Range: Breeds throughout the United States (except the southwestern part) and southern Canada; winters from Mexico to South America.

Habits and economic status: The kingbird is a pronounced enemy of hawks and crows, which it vigorously attacks at every opportunity, thereby affording efficient protection to near-by poultry yards and young chickens at large. It loves the open country and is especially fond of orchards and trees about farm buildings. No less than 85 per cent of its food consists of insects, mostly of a harmful nature. It eats the common rose chafer or rose bug, and, more remarkable still, it devours blister beetles freely. The bird has been accused of eating honeybees to an injurious extent, but there is little ground for the accusation, as appears from the fact that examination of 634 stomachs showed only 61 bees in 22 stomachs. Of these 51 were useless drones. On the other hand, it devours robber flies, which catch and destroy honeybees. Grasshoppers and crickets, with a few bugs and some cutworms, and a few other insects, make up the rest of the animal food. The vegetable food consists of fruit and a few seeds. The kingbird deserves full protection.

ARKANSAS KINGBIRD (Tyrannus verticalis)

Length, 9 inches. The white edge of the feather on each side of the tail distinguishes this from all other flycatchers except the gray and salmon-colored scissortail of Texas.

Range: Breeds from Minnesota, Kansas, and Texas to the Pacific Ocean and from northern Mexico to southern Canada; winters from Mexico to Guatemala.

Habits and economic status: The Arkansas kingbird is not so domestic as its eastern relative and seems to prefer the hill country with scattered oaks rather than the orchard or the vicinity of ranch buildings, but it sometimes places its rude and conspicuous nest in trees on village streets. The bird's yearly food is composed of 87 per cent animal matter and 13 per cent vegetable. The animal food is composed almost entirely of insects. Like the eastern species, it has been accused of destroying honeybees to a harmful extent, and remains of honeybees were found to constitute 5 per cent of the food of the individuals examined; but nearly all those eaten were drones. Bees and wasps, in general, are the biggest item of food (38 per cent); grasshoppers and crickets stand next (20 per cent); and beetles, mostly of noxious species, constitute 14 per cent of the food. The vegetable food consists mostly of fruit, such as the elder and other berries, with a few seeds. This bird should be strictly preserved.

NIGHTHAWK (Chordeiles virgianus)

Length, 10 inches. Not to be confused with the whippoorwill. The latter lives in woodland and is chiefly nocturnal. The nighthawk often flies by day, when the white bar across the wing and its nasal cry are distinguishing.

Range: Breeds throughout most of the United States and Canada; winters in South America.

Habits and economic status: The skillful evolutions of a company of nighthawks as the birds gracefully cleave the air in intersecting circles is a sight to be remembered. So expert are they on the wing that no insect is safe from them, even the swift dragonfly being captured with ease. Unfortunately their erratic flight tempts men to use them for targets, and this inexcusable practice is seriously diminishing their numbers, which is deplorable, since no birds are more useful. This species makes no nest, but lays its two spotted eggs on the bare ground, sometimes on the gravel roof of the city house. The nighthawk is a voracious feeder and is almost exclusively insectivorous. Some stomachs contained from 30 to 50 different kinds of insects, and more than 600 kinds have been identified from the stomachs thus far examined. From 500 to 1,000 ants are often found in a stomach. Several species of mosquitoes, including *Anopheles*, the transmitter of malaria, are eaten. Other well-known pests destroyed by the nighthawk are the Colorado potato beetle, cucumber beetles, chestnut, rice, clover-leaf, and cotton-boll weevils, bill-bugs, bark beetles, and squash bugs.









Horned Lark
Kingbird

Arkansaw Kingbird
Nighthawk
10

MAGPIE (Pica pica hudsonia)

Length, from about 18 to 21 inches. The black head and body and the white belly, white wing patches, and long tail are distinguishing features. The yellow-billed magpie is smaller, with a yellow bill.

Range: A characteristic western species. Breeds from Aleutian Islands and Alaska, central Alberta, southern Saskatchewan, and Winnipeg Lake south to northern Arizona and New Mexico, and from the Cascades and Sierra to western North Dakota and western Texas; resident.

There are two species of magpies, the yellow-billed being confined to California, where it is very local. In general the habits of the two are similar. "Maggie," as this bird is familiarly known in the West, possesses dual traits. He is beautiful of plumage and adds much to the interest of the landscape as he flies from field to field, his long tail extending behind like a rudder.

Of eminently sociable disposition, this bird is rarely seen alone. He prefers flocks of family size to 50 and upwards. In more ways than one the magpie is like the crow and his sagacity has developed along much the same lines. In most localities he is suspicious and wary, as he has good cause to be, for he is not a favorite with either farmer or ranchman. He is eminently carnivorous, a carrion feeder by preference, an insect eater by necessity, and he performs good service in the latter rôle. He eats also many wild fruits and berries, but he is an incorrigible thief and well he knows his way to the poultry yard.

PHŒBE (Sayornis phœbe)

Length, about 7 inches. Distinguishing marks are the dusky brown color, dark brown cap, and white margined outer tail feathers.

Range: Lives mainly in the east. Breeds from about middle Canada south to northeastern New Mexico, central Texas, northern Mississippi, and mountains of Georgia; winters from latitude 37 degrees to southern Mexico.

Few of our birds have won a more secure place in our hearts than plain little phœbe, who has no pretentions to beauty of plumage or excellence of song. For this its confiding disposition and trusting ways are responsible, and many a farmer listens for its familiar voice in early spring and welcomes it back to its accustomed haunts under the old barn. Originally building its nest on the face of cliffs, the phœbe soon forsook the wilds for man's neighborhood, and year after year apparently the same pair returns to the identical rafter in the barn, the shelter of the porch, or the same nook under the foot bridge, which they have claimed for their own for many seasons. The insistent call of "phœbe, phœbe" is as familiar as the pipe of the robin.

The phœbe is one of the most useful of birds, living almost wholly on insects, among which are many noxious kinds, as May beetles. Many phœbes remain with us till late fall, and individuals may be seen lingering in sheltered places in the woods long after other flycatchers have started for the tropics.

BLUE-FRONTED JAY (Cyanocitta stelleri and subspecies)

Length, 11¾ to 13 inches. Easily distinguished from its fellows by its high crest, brownish slaty foreparts, dark blue wings and tail, and blue or whitish streaks on forehead.

Range: Resident in western North America from southern Alaska and Montana to Mexico.

The blue-fronted jays, of which the Steller jay may be taken as the type, are common inhabitants of the piny woods of both the Rocky Mountain and the Sierra Nevada States. They are among the handsomest of the family, the beauty of their plumage, their long erectile crests, and their insistent voices compelling the attention of any who invade their retreats. Not being residents of cultivated districts, although they eat grain and small fruits, they do comparatively little damage. On the other hand, they do not do much good; for, although they are insect eaters, insects do not constitute a large part of their food, nor are the kinds they eat very important economically. Probably their most serious fault is a fondness for the eggs and young of small insectivorous birds, of which they destroy many in the course of the year. They share this failing with all other members of the family, and bird lovers must deem it a pity that such bold, dashing, handsome birds as the jays should be so destructive to small but useful birds. This habit is all the more to be deplored inasmuch as when unmolested jays readily respond to invitations to be neighborly, and willingly take up their abode near houses, where they never fail to excite admiration and interest.

WOOD PEWEE (Myiochanes virens)

Length, about 6½ inches. Not readily distinguished by color, though darker than most other small flycatchers, and with wing longer than tail.

Range: Breeds from Manitoba and southeastern Canada to southern Texas and central Florida; winters in Central and South America.

The wood pewee is clad in such modest garb and is of such retiring disposition that, were it not for its voice, it would often be passed unnoticed even by the most observant, especially as its home is in shaded glens or deep woods. Here the wood pewee pursues its vocation with a vigor worthy of all praise, and the snap of its mandibles as they close over some luckless flying insect is often the only sound heard in the depths of the quiet forest. There is little about the habits and make-up of this, or indeed of any of the flycatchers, to suggest great constructive skill, but the nest of the wood pewee is a marvel of taste and ingenuity and, though much larger, suggests the dainty architecture of our hummingbirds. Like their fairy creations, the wood pewees' nest is covered with lichens and saddled neatly across a limb.

The food of this flycatcher consists almost exclusively of insects and includes, among others, crane flies, beetles, dragonflies, ants, grasshoppers, caterpillars, and moths of many kinds. It also devours such pests as the weevils and many flies, including the house fly.









Black-billed Magpie
Yellow-billed Magpie
Phœbe

Blue-fronted Jay
Wood Pewee

VESPER SPARROW (Pooecetes gramineus and subspecies)

Length, about 6 inches. Its white-tipped outer tail feathers distinguish this individual from its brown liveried fellows.

Range: Breeds from southern Canada south to Oregon, Arizona, Texas, Kentucky, Virginia, and North Carolina; winters from southern California, Texas, Missouri, and North Carolina south to the Gulf coast and southern Mexico.

There is little about this brown-streaked sparrow to attract attention and, until it flies and displays the white-tipped tail feathers, you might mistake the bird for any one of a half dozen of the sparrow family. Indeed, if one catches merely a glimpse of a vesper sparrow crouched low and running swiftly through the grass one may be forgiven for mistaking the bird for a mouse. It frequents open pastures and when singing likes to mount a rocky boulder so common in New England and other parts of the east. We are perhaps justified in calling its song its most notable characteristic. Though not a pretentious effort, the voice of the vesper sparrow is sweet and plaintive beyond expression, and harmonizes with the dying day as does the song of no other bird.

Prof. Beal records the fact that in winter the food of this sparrow consists wholly of vegetable matter, while in summer it consists of little else than insects. The vesper sparrow cares less for grass seed than any other of its fellows, but consumes great quantities of weed seeds. It eats also large numbers of grasshoppers, caterpillars, and weevils. A number of these sparrows taken in Utah, where the newly imported alfalfa weevil is doing much damage, were found to have eaten these weevils to the average extent of more than half their food. Thus the value of this bird to the farmer cannot be questioned.

BLUE GROSBEAK (Guiraca cærulea and subspecies)

Length, about 7 inches. Distinguished by its larger size from the indigo bird which alone resembles it.

Range: Breeds in the southern United States north to northern California, Colorado, Nebraska, southern Illinois, and Maryland, and south to southern Mexico; winters in Mexico and Central America.

One seldom sees the blue grosbeak at short range or under circumstances which make identification easy, as the bird is rather shy and frequents brushy thickets and viny tangles much as does the indigo bird. The low warbling song of this grosbeak may be compared with that of the purple finch, but it is neither so loud nor so well sustained. Under the name of "blue pap," the grosbeak used to be a favorite cage bird in Louisiana and other Southern States, and no doubt is so today, despite protective laws. In the matter of diet it shows a marked preference for insect food over vegetable, the proportion being about 67 to 33 per cent. The vegetable matter includes many weed seeds, as foxtail and bindweed.

CARDINAL (Cardinalis cardinalis and subspecies)

Length, about 8¼ inches. Its size, crest, and bright red color serve for instant identification.

Range: Southern United States generally, west to Texas and southern Arizona, north to lower Hudson, northern Ohio, northern Indiana, southern Iowa, and southeastern South Dakota; resident.

The cardinal is a notable bird and any locality he chooses for his residence must be considered highly favored. His bright colors, trim form, and erectile crest, his clear whistling call, and his fine song are all to his credit. He is a resident of thickets and tangled undergrowth with hanging vines, and, when these are provided and he feels safe from the prowling cat and marauding hawk, he will take up his abode in your garden or back yard as readily as anywhere else. Favor him further by supplying him food and water in winter and you make him your friend indeed. Practically he is a resident wherever found, and the sight of his flashing red suit amidst snow-covered bushes is a memorable picture. The cardinal used to be a favorite cage bird in the Southern States, and the business of trapping him for market, especially about the large southern cities, was common. The bird is now protected by law as it should be, and the sight of a cardinal behind prison bars has become rare indeed. How many thousands were sacrificed for hat gear we shall never know, but happily this practice too is fast disappearing.

By preference the cardinal is a vegetarian, and about seven-tenths of its food consists of vegetable matter in the form of seeds, berries, etc. But it also eats many insects, potato beetles, cotton worms, boll worms, cotton-boll weevils, codling moths, and many other scarcely less noteworthy. Mr. McAtee, in attempting to sum up all the economic facts, declares that the bird does at least fifteen times as much good as harm, which is a record to be proud of.

CALIFORNIA QUAIL (Lophortyx californica and varieties)

Length, about 9½ inches. Distinguished from Gambels' quail by the reddish instead of black belly.

Range: Resident in the Pacific Coast region from southwestern Oregon and western Nevada through California and Lower California.

The California quail is one of our most beautiful game birds, and the sight of a large covey running daintily along, with crests nodding and fine plumage gleaming in the sun is a sight to remember. Before quail were so much persecuted covies were common in the gardens of Oakland and other California towns, seemingly as much at home among calla lilies and rose bushes as in the stubble field. The numerous families in the fall associate in bands of three or four hundred, or even more. The California quail has learned one lesson never acquired by our bobwhite—to roost in trees and bushes instead of on the ground—and no doubt the safety thus obtained during the hours of darkness is one reason for its great abundance.









Vesper Sparrow

Blue Grosbeak
Male, upper; female, lower

Cardinal
Male, upper; female, lower

California Quail

BREWER'S BLACKBIRD (Euphagus cyanocephalus)

Length, 10 inches. Its glossy purplish head distinguishes it from other blackbirds that do not show in flight a trough-shaped tail.

Range: Breeds in the West, east to Texas, Kansas, and Minnesota, and north to southern Canada; winters over most of the United States breeding range, south to Guatemala.

Habits and economic status: Very numerous in the West and in fall gathers in immense flocks, especially about barnyards and corrals. During the cherry season in California Brewer's blackbird is much in the orchards. In one case they were seen to eat freely of cherries; but when a neighboring fruit raiser began to plow his orchard almost every blackbird in the vicinity was upon the newly opened ground and close at the plowman's heels in its eagerness to get the insects exposed by the plow. Caterpillars and pupæ form the largest item of animal food (about 12 per cent). Many of these are cutworms, and cotton bollworms or corn earworms were found in 10 stomachs and codling-moth pupæ in 11. Beetles constitute over 11 per cent of the food. The vegetable food is practically contained in three items—grain, fruit, and weed seeds. Grain, mostly oats, amounts to 54 per cent; fruit, largely cherries, 4 per cent, and weed seeds, not quite 9 per cent. The grain is probably mostly wild, volunteer, or waste, so that the bird does most damage by eating fruit.

BULLOCK'S ORIOLE (Icterus bullocki)

Length, about 8 inches. Our only oriole with top of head and throat black and cheeks orange.

Range: Breeds from South Dakota, Nebraska, and Kansas to the Pacific Ocean and from southern Canada to northern Mexico; winters in Mexico.

Habits and economic status: In the West this bird takes the place occupied in the East by the Baltimore oriole. In food, nesting habits, and song the birds are similar. Both are migratory and remain on their summer range only some five or six months. They take kindly to orchards, gardens, and the vicinity of farm buildings and often live in villages and city parks. Their diet is largely made up of insects that infest orchards and gardens. When fruit trees are in bloom they are constantly busy among the blossoms and save many of them from destruction. In the food of Bullock's oriole beetles amount to 35 per cent and nearly all are harmful. Many of these are weevils, some of which live upon acorns and other nuts. Ants and wasps amount to 15 per cent of the diet. The black olive scale was found in 45 of the 162 stomachs examined. Caterpillars, with a few moths and pupæ, are the largest item of food and amount to over 41 per cent. Among these were codling-moth larvæ. The vegetable food is practically all fruit (19 per cent) and in cherry season consists largely of that fruit. Eating small fruits is the bird's worst trait, but it will do this harm only when very numerous.

CALIFORNIA JAY (Aphelocoma californica)

Length, 12 inches. Distinguished from other jays within its range by its decidedly whitish underparts and brown patch on the back.

Range: Resident in California, north to southern Washington, and south to southern Lower California.

Habits and economic status: This jay has the same general traits of character as the eastern blue jay. He is the same noisy, rollicking fellow and occupies a corresponding position in bird society. Robbing the nests of smaller birds is a favorite pastime, and he is a persistent spy upon domestic fowls and well knows the meaning of the cackle of a hen. Not only does he steal eggs, but he kills young chicks. The insect food of this jay constitutes about one-tenth of its annual sustenance. The inclusion of grasshoppers and caterpillars makes this part of the bird's food in its favor. But the remainder of its animal diet includes altogether too large a proportion of beneficial birds and their eggs, and in this respect it appears to be worse than its eastern relative, the blue jay. While its vegetable food is composed largely of mast, at times its liking for cultivated fruit and grain makes it a most unwelcome visitor to the orchard and farm. In conclusion, it may be said that over much of its range this jay is too abundant for the best interests of agriculture and horticulture.

BLUE JAY (Cyanocitta cristata)

Length, 11½ inches. The brilliant blue of the wings and tail combined with the black crescent of the upper breast and the crested head distinguish this species.

Range: Resident in the eastern United States and southern Canada, west to the Dakotas, Colorado, and Texas.

Habits and economic status: The blue jay is of a dual nature. Cautious and silent in the vicinity of its nest, away from it it is bold and noisy. Sly in the commission of mischief, it is ever ready to scream "thief" at the slightest disturbance. As usual in such cases, its remarks are applicable to none more than itself, a fact neighboring nest holders know to their sorrow, for during the breeding season the jay lays heavy toll upon the eggs and young of other birds, and in doing so deprives us of the services of species more beneficial than itself. Approximately three-fourths of the annual food of the blue jay is vegetable matter, the greater part of which is composed of mast—that is, acorns, chestnuts, beechnuts, and the like. Corn is the principal cultivated crop upon which this bird feeds, but stomach analysis indicates that most of the corn taken is waste grain. Such noxious insects as wood-boring beetles, grasshoppers, eggs of various caterpillars, and scale insects constitute about one-fifth of its food.









Brewer's Blackbird
California Jay

Bullock's Oriole
Blue Jay

VARIED THRUSH (Ixoreus nævius)

Length, about 10 inches. Its large size and dark slate-colored upper parts, black breast collar, orange brown stripe over eye, and orange brown under parts mark this thrush apart from all others.

Range: Breeds on the Pacific coast from Yakutat Bay, Alaska, south to Humboldt County, California; winters from southern Alaska to northern California.

This, one of our largest and finest thrushes, is limited to the west coast, where it finds a congenial summer home in the depths of the coniferous forests, the mystery and loneliness of which seem reflected in its nature. Although the varied thrush somewhat suggests our robin, it is much shyer, and its habits and notes are very different, making it more nearly akin to the small olive thrushes. It nests in the conifers, and its eggs, unlike those of the robin, are heavily blotched with brown. Its song, a single long-drawn note, has been greatly praised and seems entirely in harmony with the bird's surroundings, being weird and inspiring. In winter the varied thrush abandons the forest, and with it many of the habits of the recluse, and visits more open districts, including ravines and even gardens, where it becomes quite familiar.

This thrush, like its smaller brethren, feeds chiefly on the ground, and its food is largely of vegetable nature, but includes a fair proportion of insects, with millepeds and snails. Unless its habits are greatly modified by the encroachment of civilization on its domain, it is not likely to be much of a factor in agricultural affairs, but it will continue to make itself useful by destroying the insect enemies of forest trees.

VEERY (Hylocichla fuscescens fuscescens)

Length, about 7½ inches. To be known from the other small thrushes by its uniform cinnamon brown upper parts and its faint brown breast markings.

Range: Breeds from northern Michigan, central Ontario, and Newfoundland south to northern Illinois, northern Indiana, northern Ohio, and New Jersey, and in the Alleghenies south to North Carolina and northern Georgia; winters in South America.

Far more retiring than either the wood thrush or the hermit, the veery must be sought in the seclusion of the swamp or swampy woodland, far from the recesses of which he rarely ventures. Much of his time he spends on the ground, for on or near it he finds his chosen fare. Though trim in form and clad in a garb of modest color as befits his nature, the veery appeals less to the bird lover's eye than to his ear. Though some of his relatives are classed among the most famous of American songsters, the veery may fairly claim place in the front rank, and his wild, mysterious, and all-pervading notes touch certain chords in the human breast which respond to the song of no other of our birds.

The food of the veery does not differ essentially from that of the other thrushes and includes a great variety of wild fruits and insects.

WOOD THRUSH (Hylocichla mustelina)

Length, about 8¼ inches. To be distinguished among its fellows by its more bulky form, by the golden brown head, bright cinnamon upper parts, and the large round black spots beneath, sharply contrasting with the pure white.

Range: Breeds from southern South Dakota, central Minnesota, central Wisconsin, southern Ontario, and southern New Hampshire south to eastern Texas, Louisiana, and northern Florida; winters from southern Mexico to Central America.

The wood thrush finds its way to our hearts and sympathies more through its voice than its presence, and whoever has failed to hear its clear flute-like tones rising from the woodland depths as the mists of evening gather has missed a rich treat. It is no doubt true that the hermit thrush is a more finished performer, but that chorister reserves his music chiefly for the northern wilds, while our wood thrush favors more southern lands. Moreover, the hermit is a true recluse and must be sought in the deeper forest, its chosen home, while its more southern cousin lives in comparatively open woodland and does not disdain to take up its summer residence in parks and gardens. The music of the one is for the favored few, while the song of the other is almost as well known as that of the brown thrasher.

Like most of the tribe, the wood thrush obtains its food chiefly from the ground, where it spends much of its time searching among the leaves. Insects with a small percentage of fruit, chiefly wild varieties, compose its fare. Among the insects are cutworms and other caterpillars, ants, grasshoppers, and beetles, including the Colorado potato beetle. Thus the bird deserves a high place in our esteem for both esthetic and economic reasons.

BUSH-TIT (Psaltriparus minimus and subspecies)

Length, from 4 to 4½ inches.

Range: Pacific coast from southern British Columbia to the Cape Region of Lower California, and eastward to the interior of Oregon and California; nests generally throughout its range.

This pigmy among birds has many of the characteristic habits of the chickadee family, of which it is the smallest member. Extremely sociable, bush-tits move about in large flocks, occasionally in company with other birds, generally without. One moment you are alone, the next moment the trees and bushes are full of these diminutive little busybodies that scan you with their curious bead-like eyes as they hurry on in quest of food, keeping up the while a constant calling and twittering. Their pendant nests, often attached to oak trees, suggest the well-known structure of our hang-bird or Baltimore oriole and are excellent specimens of bird architecture.

The few Western States favored by the presence of this bird are to be congratulated, as more than half its animal food consists of insects and spiders, nearly all of which are harmful.









Varied Thrush
Veery

Wood Thrus
Bush-ti

TOWHEE (Pipilo erythrophthalmus)

Length, about 8¼ inches. Male mostly black, belly white. Female brown. Outer tail feathers white tipped.

Range: Breeds in the United States from Saskatchewan and southeastern Canada south to central Kansas and northern Georgia; winters from southeastern Nebraska and the Ohio and Potomac southward.

The towhee is a frequenter of second-growth and of scrub, and when the visitor enters such precincts he is pretty sure to hear the challenging cry, "chewink," and to catch sight of the bird as it hurriedly dashes into some brushy thicket as if in mortal terror. The flight is hurried, jerky, and heavy, as though the bird was accustomed to use its wings only in emergencies. This is not far from being the case, as the towhee sticks close to mother earth and uses its great strength and long claws to advantage in making the leaves and rubbish fly in its vigorous efforts to uncover the seeds and insects upon which it relies for food. The towhee thus literally scratches for a living as no other of our birds does, except possibly the brown thrush, and the lazy man may well pass by the industrious ant and go to the towhee for inspiration. No one waxes enthusiastic over its musical ability, but the song is given with such right good will that it is sure to satisfy the hearer as, no doubt, it does the bird himself. The towhee includes in its bill of fare beetles and their larvæ, ants, moths, caterpillars, grasshoppers, and flies, and also in Texas the boll weevil. Wild fruit and berries complete the list.

ORCHARD ORIOLE (Icterus spurius)

Length, about 7¼ inches. Our only oriole with black and chestnut markings. Female grayish olive green.

Range: Confined to eastern North America. Breeds from North Dakota, Minnesota, Wisconsin, Michigan, southern Ontario, central New York, and Massachusetts south to northern Florida, the Gulf coast and southern Mexico, west to central Nebraska and western Kansas; winters from southern Mexico to northern Colombia.

Though clad in modest garb (for an oriole) and in no respect a rival of the Baltimore, the orchard oriole has merits of his own. As his name implies, he is a lover of orchards, and I have always associated him with the glory of apple orchards in full bloom and with the delicious perfume with which the air is heavy. Amidst such surroundings, the black and chestnut livery of the orchard oriole marks him as one of the princes of our bird world. Gardens and parks also know him well, and he is not averse to swinging his nest from the trees that shade the farmer's house. His nest betrays his connection with the family of weavers, but his skill does not equal that of the Baltimore and he is content with a smaller pensile basket made chiefly of grasses. His song, like his dress, is modest, but it is exceedingly sweet, and one who hears it is sure to pause in his walk and wish that it were longer and given more frequently.

CALIFORNIA BROWN TOWHEE (Pipilo crissalis and varieties)

Length, about 9 inches. The long tail and brown plumage with white belly distinguish these ground- and thicket-loving birds.

Range: Southwestern Oregon, through California to northern Lower California.

The brown towhees, of which the California form is a good type, are characteristic of the brushy canyons of the far west, where they skulk and hide among the shrubbery and cactus much as do the common eastern towhees. Their powers of wing are not great and their long tails and heavy bodies render their flight awkward in the extreme. On the ground, however, they run with great ease and speed. In California brown towhees are common in the parks and gardens, and in every way are very much more familiar than the related towhee of the east. Like its eastern cousin, it is much addicted to scratching among leaves and rubbish, for which work its stout legs and claws are particularly adapted. The thin "tchip," which is the call note, seems out of all proportion coming from such a stout, vigorous body. The birds of this group are not fine songsters, but their simple ditties are pleasant to hear in the waste places where they are generally found.

The brown towhee is much more of a vegetarian than an insect eater, and in California Professor Beal found that 85 per cent of its yearly food consists of fruit, grain, and weed seeds.

BALTIMORE ORIOLE (Icterus galbula)

Length, about 7½ inches. The combination of black and orange marks this bird from its fellows.

Range: Breeds from central Saskatchewan and the southeastern provinces of Canada south to northern Texas, Louisiana, and northern Georgia, west to Montana, Wyoming, and eastern Colorado; winters from southern Mexico to Colombia.

Lord Baltimore was signally honored when one of our finest birds was christened with his name because it chanced to carry the family colors—black and yellow. Orioles are a tropical group and the luxuriant tropical forests are bright with the gleaming colors of many species of these beautiful birds. Only a few have found their way into the temperate zone, but not one of the tropical species is garbed in more tasteful dress than this exotic which has adopted the elms and sycamores of the temperate zone for its summer home. When chill November winds have stripped our shade trees of their foliage then are revealed the long, pendant nests, wrought with so much skill and patience by Madame Oriole, and we begin to realize how many of these birds summer with us. Suitable material for the oriole nest is none too easily found, and the weaver is not so fastidious that she will not accept strings and yarn of any color which are hung out for her convenience; so that at the end of the oriole season the bird lover who is willing to coöperate with a pair of Nature's weavers may fall heir to a nest made to order.



Towhee or Chewink
Male, upper; female, lower
Orchard Oriole
Male, upper; female, lowe

California Brown Towhi
Baltimore Oriole
Male, upper; female, lower

TREE SWALLOW (Iridoprocne bicolor)

Length, about 6 inches. The steel blue upper parts and pure white under parts are distinguishing characteristics.

Range: Breeds from northwestern Alaska and northern Canada south to southern California, Colorado, Kansas, Missouri, and Virginia; winters in central California, southern Texas and Gulf States, and south to Guatemala.

In its primitive state the tree swallow used to nest in hollow trees, and in some parts of the country it still continues to do so. Early in the settlement of the country it saw the advantage of putting itself under man's protection, and now no bird is quicker to respond to an invitation to nest in a box dedicated to its use. The bird lover within the range of the species may secure an interesting tenant or two by the expenditure of a little trouble and labor, since the bird is not a bit fastidious as to its domicile, providing it is weather tight. Tree swallows arrive from the South early in April and soon begin to nest. In the fall they gather in great flocks preparatory to their departure, and may then be seen by hundreds perched on telegraph wires. As is the habit with swallows generally, tree swallows migrate by day, feeding as they go, and a flock passing swiftly south presents to the casual observer an everyday appearance well calculated to deceive. Watch the flock as it crosses the road and passes from field to field and you will notice that while the line of flight has many a twist and turn it trends steadily to the south, and that no individual takes the back track.

The tree swallow consumes vast numbers of gnats, flying ants, beetles, mosquitoes, and other flying insects. It exhibits a rather curious departure from the traditions of its kind in that it appears to be very fond of the berries of the bayberry or wax myrtle. It also often chooses these bushes for a roosting place at night.

SCARLET TANAGER (Piranga erythromelas)

Length, about 7¼ inches. The scarlet coat and black wings and tail mark this bird out from all others.

Range: Breeds from southern Canada south to southern Kansas, northern Arkansas, Tennessee, northern Georgia, and mountains of Virginia and South Carolina; winters from Colombia to Bolivia and Peru.

The tanagers are strictly an American family, and, as their bright colors might seem to suggest, they originated in the Tropics to which most of the numerous species are confined. In fact, the gleam of scarlet from the coat of this tanager in our somber woods always seems a little out of place, as though the bird were an alien. But it is wholly at home with us, and, indeed, does not hesitate to make its summer residence still farther north in Canada. Curiously enough, the nearest relatives of the brilliant tanagers in the bird world are the plainly colored sparrows. The chirp-churr of the tanager is a familiar call note in our northern woods, while its song is one of the sweetest.

CLIFF SWALLOW (Petrochelidon lunifrons and subspecies)

Length, about 6 inches. The rufous upper tail coverts serve to distinguish this swallow from other species.

Range: Breeds from central Alaska and northern Canada south over the United States (except Florida) and to Guatemala; winters in South America.

The cliff and the barn swallow are members in good standing of the original guild of masons, and their clever constructive work in nest building with mud pellets will bear the severest professional inspection. Through much of the West the cliff swallow still attaches its mud house to the faces of cliffs as from time immemorial, and it was not until the farmers' house and barn offered a satisfactory substitute for granite and sandstone bluffs that the bird became really numerous in our Eastern States. In some localities this swallow is not a welcome guest about the homestead, as its nest is apt to contain parasites which the good housekeeper fears. Such parasites, however, are not to be dreaded, as they will live only on birds. The cliff swallow performs invaluable service to man, since its food consists wholly of insects, and among them are many pestiferous kinds, such as leaf bugs, leaf-hoppers, and the boll weevil. Whoever, then, protects this and other species of swallows and encourages their presence on their premises does good and patriotic service and can, moreover, be sure of adequate reward.

WESTERN TANAGER (Piranga ludoviciana)

Length, about 7 inches. The combination of orange-red head, black back, and yellow under parts is distinctive.

Range: Breeds from northeastern British Columbia, southwestern Mackenzie, and southwestern South Dakota to the mountains of southern California and New Mexico; winters from central Mexico to Guatemala.

Discovered in Idaho by Lewis and Clark in 1806, this tanager has thus been known more than a hundred years, in which time it has become one of the most familiar of western birds. It is a common inhabitant of both the western Rocky Mountains and the Sierra Nevada, and is very much at home among the pine woods of which it is the brightest ornament. In general its habits are like those of its scarlet cousin, and it also has a sweet song very similar in general effect. In California this tanager has acquired an evil reputation by attacks on the cherry crop, and there is no doubt that when it assembles in large numbers in the fruit districts it is the cause of heavy loss to small fruit growers. Under ordinary circumstances, however, the greater part of its food consists of insects, many of them harmful. Two very harmful families of beetles, whose larvæ are wood borers and do much damage to trees and other plants, are represented in the food. The planting of berry-bearing trees near the orchard would no doubt prevent much of the loss occasioned by this bird, which by no means occurs every year.









Tree Swallow
Scarlet Tanager
Male, upper; female, lower

Cliff or Eave's Swallow
Western Tanager
Male, upper; female, lower

INDIGO BUNTING (Passerina cyanea)

Length, about 5½ inches. The male is easily identified by the rich blue color, with black wings and tail. The female is warm brown.

Range: Breeds from eastern North Dakota, central Minnesota, northwestern Michigan, southern Ontario, and southern New Brunswick to central Texas, southern Louisiana, central Alabama, and central Georgia; winters from southern Mexico to Panama.

The indigo bird is the brightest colored sparrow that visits the north, but one can hardly believe that the sprightly dandy, clad in his rich blue suit, is the mate of the inconspicuous brown bird that seeks assiduously to conceal herself in the leafy cover, as though a bit ashamed of the contrast between her working suit and the holiday garb of her spouse. The indigo is a frequenter of sprout land, of brushy thickets, and of open woodland, and the male is fond of singing his cheerful lay from the topmost twig of a tall shrub or tree, as though challenging the world to produce his equal. For such a dainty bird, the nest is a singularly inartistic structure and very carelessly built. It is placed in the crotch of some low leafy bush and is not at all difficult to find.

The fine feathers of the male are not the only claim of the indigo bird to our interest. Its food consists largely of weed seed, but it eats many insects, including a goodly proportion of grasshoppers and caterpillars.

WHITE-THROATED SPARROW (Zonotrichia albicollis)

Length, about 6¾ inches. The white throat and yellow before the eye are its distinguishing colors.

Range: Over most of eastern North America. Breeds in much of Canada south to southern Montana, central Minnesota, central Wisconsin, and in the mountains of northern Pennsylvania, New York, and Massachusetts; winters south of the Ohio.

This is one of the bird lovers' favorites, as well it may be. Its beautifully variegated plumage, its jaunty ways, its familiarity, and its sweet and plaintive whistle all combine to commend the bird to our interest. In the fall it comes to us in large flocks associated with other species, especially juncos and various other sparrows. The "peabody bird" is singularly prodigal of its sweet song, and the young white-throats begin to try their voices in the fall as if practicing for the more exacting demands of spring. When a number join in the fall chorus the result is singularly sweet and inspiring. Many a camper in the north woods, as he lies in his blanket under the stars, pays tribute to the sweet voice of this songster, as it is borne on the midnight air to his ears from some leafy retreat.

The food habits of this sparrow give it a place among the farmers' friends. It is a great destroyer of weed seed and is especially fond of those of ragweed and bindweed. In the cotton belt, where many white-throats winter, it includes among its insect food the boll weevil.

LAZULI BUNTING (Passerina amœna)

Length, from 5¼ to 5½ inches. Male blue above, breast brownish; wing bars white. Female brownish.

Range: Breeds from southern British Columbia, southern Alberta, southeastern Saskatchewan, and western North Dakota to southern California and southwestern Texas; winters in Mexico.

The lazuli finch is a near relative of the indigo bunting and the nonpareil, and its habits are in a general way very similar. There is the same disparity between the dress of the sexes, the color of the female being comparatively dull and homely. The male, however, is a gay plumaged dandy in his suit of turquoise blue, and is likely to surprise the stranger who meets him for the first time, since his colors suggest a tropical setting and are somewhat out of keeping with his surroundings. Notwithstanding his fine feathers, he is not so fond of displaying himself as is his cousin, the indigo bird, but seems to think that the cover of brush and chaparral is essential to his safety. This song is vivacious and pleasing and the Easterner who hears it for the first time will have no difficulty in guessing at the identity of the chorister, from the resemblance of his lay to the ditty of the indigo bird.

SLATE-COLORED JUNCO (Junco hyemalis)

Length, about 6¼ inches. Prevailing color grayish slate, belly white; outer tail feathers tipped with white.

Range: Breeds in much of Alaska and Canada and in the mountains of New York, Pennsylvania, and Massachusetts, while a nearly related form (the Carolina junco) breeds in the southern Alleghenies; winters throughout the Eastern States to the Gulf.

Only one junco inhabits the eastern United States, but several species live in the west. All of the members of the group resemble each other in a general way and all have similar habits. Most of us know the junco only in the fall and when, after having summered in the mountains of the more northern districts, the birds gather in large flocks and forsake high altitudes for more congenial surroundings. The junco associates with other sparrows, usually far outnumbering them, but its slate-colored plumage and white tail feathers reveal its presence unmistakably. Its familiar "tsip" may be easily recognized among the medley of notes, but its low sweet song is to be heard at its best only in its alpine home. When snow is on the ground, the juncos are often hard pushed for food, and on such occasions a flock will readily respond to an invitation to visit the dooryard and dine on table crumbs or small seeds of any kind.

The junco is one of our most persistent grass and weed seed eaters and in winter and spring seeds constitute much the greater part of its fare.









INDIGO BUNTING
Male, upper; female, lower
WHITE-THROATED SPARROW

LAZULI BUNTING
Male, upper; female, low
SLATE-COLORED JUNCO

BLACK FLYCATCHER; PHAINOPEPLA (Phainopepla nitens)

Length, about 7½ inches. The glossy black color and marked crest of the male and the brownish gray of the female, also crested, distinguish this species.

Range: Breeds from central California, Nevada, Utah, and southwestern Texas southward; winters from southern California southward.

Though a distant relative of the cedar bird, the phainopepla differs markedly from that species both in appearance and habits. It is known to few, for it lives chiefly in the desert country of the Southwest, though it is not wholly a stranger in the parks and gardens of that region. When flying the white wing-patch becomes conspicuous and distinguishes the bird from all others. In the fall it is not unusual to find it in loose flocks the members of which are drawn temporarily together, perhaps by the abundance of some favorite food. Like the cedar bird, it is essentially a berry eater, and in California sometimes makes free of the cherry crop. Its chief dependence, however, is the mistletoe, the mucilaginous berries of which delight it, as also do those of the juniper and pepper. Its partiality for mistletoe is probably the bird's worst trait, as it distributes the seeds of this pernicious parasite to the detriment of many fine oaks and sycamores. It eats many insects, principally ants, and has the habit of perching on a tall shrub, from which it sallies forth after flying insects, thus simulating a flycatcher. The phainopepla has a variety of call notes and a very pleasant song.

YELLOW-THROATED VIREO (Lanivireo flavifrons)

Length, about 6 inches. Its green upper parts and bright yellow throat and upper breast are its identification marks.

Range: Breeds from southern Canada south to central Texas, central Louisiana, and central Florida; winters from southern Mexico through Central America.

By no means so common as the red-eye, the yellow-throat inhabits the same kind of woodland tracts and, like it, may often be seen, and still oftener heard, in the trees that shade the village or even the city streets. It is, however, much less common in such places since the advent of the English sparrow, having been driven away by that little pest. Its song is much like that of the red-eye, yet it has a rich throaty quality quite foreign to the notes of that tireless songster and far superior to them. Neither this nor indeed any of the vireos ever seem to be in a hurry. They move quietly through the leafy covert, scanning the most likely lurking places for insects, pausing now and then to sing in a meditative manner, then renewing their quest. All of which is as different as possible from the busy, nervous movements of the wood warblers, that seem ever in haste as though time were much too precious to waste.

The food of the yellow-throat consists of a large variety of insects, including caterpillars, moths, and beetles, and flies and mosquitoes.

RED-EYED VIREO (Vireosylva olivacea)

Length, about 6¼ inches. The slaty gray crown inclosed by narrow black lines serves to identify this vireo.

Range: Breeds from central Canada south to southeastern Washington, southern Montana, eastern Wyoming, eastern Colorado, western Texas, and central Florida; winters in South America.

The red-eye is one of the commonest not only of our vireos, but also of all our small birds, and inhabits every suitable piece of woodland throughout its territory. Its notes may be frequently heard coming from the village shade trees; city parks and streets also know it. Its most notable trait is its habit of singing almost continuously as it moves slowly through the branches, pausing now and then to pick up a caterpillar or other insect. In woods where these vireos are common its voice may be heard all the livelong day, even during the noon hours, when most birds are silently resting. The nest, suspended in a V-shaped fork, is a beautiful specimen of avian architecture, and so indifferent is the bird to its location that the nest of no other bird is so frequently seen by the chance passer-by.

Though fond of mulberries and sassafras berries, the red-eye eats insects by preference, and spends most of its time gleaning the branches for plant lice, scales and caterpillars of various kinds. It eats such harmful beetles as the long-horned borers and weevils. I once saw a red-eye with a full-grown luna moth in its bill. After vigorously beating the helpless moth on a limb to get rid of the wings, the bird succeeded in reducing the enormous body to a formless mass which it eventually swallowed.

LARK SPARROW (Chondestes grammacus and subspecies)

Length, about 6¼ inches. The variegated head markings and white outer tail feathers distinguish this species.

Range: From western Pennsylvania and western Maryland and the Mississippi Valley westward, and from southern British Columbia and southern Saskatchewan to central Alabama, northern Louisiana, Texas, and south into Mexico; winters from northern California, southern Texas, and southern Mississippi to Guatemala.

With some of the habits of the grass finch and, like that species, having the tail feathers tipped with white, the lark sparrow yet possesses distinctive traits of its own, and after a little scrutiny can be mistaken for no other species. Its peculiar head markings have suggested the local western name of "snake bird," although the reason is not quite obvious. The lark finch is usually very abundant where found at all, and inhabits the open country, prairie, plain, and desert. It is a really fine songster and the possession of a musical voice has led to its capture and sale as a cage bird.

It has peculiar claims on the interest of the western farmer since it is to be classed in the front rank of sparrows as a destroyer of grasshoppers.









Black Flycatcher or Phainopepla
Female, upper; male, lower

Yellow-throated Vireo

Red-eyed Vireo

Lark Sparrow

HOUSE FINCH (Carpodacus mexicanus frontalis)

Length, about 6 inches. Grayish brown above, many feathers tinged with red. Below dull white, crown, rump, and throat crimson.

Range: Resident in Oregon, Idaho, and southeastern Wyoming south to Lower California and Mexico.

The pretty little house finch of the far west is among the most domestic of American birds, and exhibits a predilection for the neighborhood of houses almost as strong as that of the English sparrow. It carols its sprightly lay from the tops of buildings in villages and even cities, and from the shrubbery of lawn and park. So confiding has the bird become that it places its nest in any crack or cranny of house or outbuilding that is large enough for its housekeeping operations. When such convenient and safe retreats are not to be had it builds a bulky nest in a tree or bush.

It is fond of fruit, including pears, cherries, and small fruit, which its strong conical bill enables it to break open with ease. Locally, therefore, it is a good deal of a pest and does much damage to fruit crops, especially where it is numerous. Much, however, can be said in mitigation of its offenses. The seeds of plants, a large proportion of those of noxious weeds, constitute seven-eighths of its food for the year. Plant lice, which are notoriously harmful to many trees and plants, also are a favorite diet. So, too, are caterpillars and beetles; therefore, the balance is decidedly in the bird's favor.

This attractive songster was carried to the Hawaiian Islands years ago and now is numerous in Honolulu and also in the forest on the island of Hawaii, where amid brighter and more tropical neighbors it seems curiously out of place, though it sings as often and as joyously as it ever did in its old haunts across the Pacific.

ARKANSAS GOLDFINCH (Astragalinus psaltria and subspecies)

Length, about 4½ inches. Upper parts olive green, more or less mixed with black in the subspecies; under parts yellow.

Range: Breeds from southern Oregon, Utah, and northern Colorado to southern Lower California and into Mexico.

In the far west this goldfinch takes the place of the eastern goldfinch which in a general way it much resembles in habits. Like that bird it is rarely seen, save in the breeding season, except in small parties, the members of which seem to be on terms of the utmost familiarity and accord. The flight of this species, as of its kindred, is exceedingly characteristic. It disdains to cleave the air in straight lines, but progresses in a series of graceful, sinuous curves, which, however, take the little aëronaut rapidly from point to point. This flight is a sure mark of identification. The bird has a sweet warbling song and even its call notes are plaintive and pleasing. It abounds in orchards and gardens and is often to be seen by the roadside gleaning its food from the tall stems of thistle or sunflowers.

PURPLE FINCH (Carpodacus purpureus)

Length, about 6 to 6¼ inches. Unlike any other eastern finch, the crimson head of the male sufficiently distinguishes it.

Range: Breeds in southern Canada and southward to North Dakota, Minnesota, Illinois, Pennsylvania mountains, and northern New Jersey; winters from somewhat north of the southern boundary of its breeding range to the Gulf States.

Considering that it is common and widely distributed, the purple finch is not so well known as it should be. For one thing it has a marked liking for the tops of trees, particularly elms, and when in a tree-top and more or less screened by foliage it requires the aid of a good glass to make its identity sure. Its warbling song is sweet and melodious, but is all too brief for perfect enjoyment, though in spring the bird is prodigal enough of its carols, and not infrequently a dozen males may be heard singing at once in the same or in contiguous trees. It frequently nests around houses and for a site is very partial to the Virginia juniper.

The purple finch lives almost entirely on the seeds of various plants, including those of false buckwheat and ragweed, with some wild berries. It is accused, not without reason, of being a confirmed budder of fruit and other trees, but the damage it inflicts on eastern orchards appears to be very slight, if indeed the modest budding it does is an injury at all.

AMERICAN GOLDFINCH (Astragalinus tristis and subspecies)

Length, about 5 inches. Easily distinguished by its rich yellow plumage and black crown and tail.

Range: Breeds from southern Canada south to southern California, southern Colorado, Arkansas, and northern Georgia.

The thistle bird is one of our best-known finches, being not only common but very sociable. It usually goes in small flocks, or family parties, and sometimes the tall thistles on which it likes to feed bend with the united weight of several of the gay plumaged little goldfinches. It is a law unto itself as regards its nesting period, and begins to think seriously about housekeeping when other birds are feeding full-grown youngsters or are debating the propriety of a second brood. The goldfinch has a pretty and plaintive call note, and its full song is well worth listening to. It is much like that of the canary, so much alike, in fact, that the bird is often called the wild canary.

Throughout the year the goldfinch is a seed eater, especially of weed seeds, and it eats also many insects, including canker worms, plant lice, and beetles. Our goldfinch sometimes annoys the farmer by attacking the lettuce seeds which have been left to mature for next season's planting, but the damage in this way is slight, and Prof. Beal has been told that even on the large seed farms of California it is never serious enough to call for protective measures.









House Finch
Female, upper; male, lower
Arkansas Goldfinch
Male, upper; female, lower

Purple Finch
Male, upper; female, lower
American Goldfinch
Male, upper; female, lower

RUBY-THROAT (Archilochus colubris)

Length, about 3¾ inches. Needs no description, as it is the only hummer living in the Eastern States.

Range: Breeds from southeastern Saskatchewan and central Quebec south to Gulf coast, west to North Dakota, Nebraska, Kansas, and central Texas; winters from middle Florida and Louisiana through southern Mexico and Central America to Panama.

Of the five hundred or more species of this strictly American family, the eastern United States is favored by the presence of only one, the ruby-throat, nor is this species as common as might be desired. Compared to the abundance of its kind in the far west it is rare indeed. As if afraid of being too prodigal of her gifts, Nature has denied the hummingbird song, and the harsh squeaks of these tiny sprites are far better adapted to making war than love. Truth is, the hummer has a sharp temper and not only engages in warfare with its own kind, but attacks any bird, however large, that ventures to dispute its territorial rights. These are not small, for in its own estimation it is literally "Lord of all it surveys." The male is an inconstant swain and no sooner is the nest made—and in the making he takes no part—and the eggs laid than he departs, leaving the joys and cares of housekeeping to his erstwhile mate. While the nectar of flowers is eaten in large quantities, a creature so vivacious as the hummer could hardly sustain life on diet so thin, and the bird adds to its bill of fare a liberal supply of minute insects and spiders of various sorts.

WHIP-POOR-WILL (Antrostomus vociferus)

Length, about 10 inches. Not to be confused with the nighthawk, which flies by day and has white wing bars, while the whip-poor-will is crepuscular and nocturnal.

Range: Breeds from the Atlantic to the plains, and from Manitoba and the eastern Canadian provinces south to northern parts of Louisiana, Mississippi and Georgia; winters from South Carolina and the Gulf States to Central America.

This bird of the night, whose day begins with the going down of the sun when the nighthawk's ends, is common throughout the east in open woodlands, on the edges of which it likes to hunt. It dozes away the hours of daylight squatting on the ground among the leaves where its marvelous protective coloration affords it safety. No sooner have the shadows lengthened, however, than it becomes active and its characteristic note resounds through the forest glades. So plaintive is its cry and so mysterious its comings and goings that in the minds of many its notes are associated with misfortune, as a death in the house near which it persistently calls. Its two eggs are laid among the leaves, needing no other protection than the cover of the mother's body. The whip-poor-will may be accounted one of our most efficient insect destroyers, as its immensely capacious mouth beset with bristles, a regular insect trap, would suggest.

RUFOUS HUMMINGBIRD (Selasphorus rufus)

Length, from 3¼ to 3¾ inches. The reddish brown body color, red and green gorget, and the notch in tail feathers serve to distinguish this species from our other hummers.

Range: Breeds from the Alaskan coast, east central British Columbia, and southern Alberta south to the mountains of central California and southern Idaho.

One can but wonder at the hardihood of this little wanderer from the tropics in including in its summer itinerary a journey to distant Alaska. It reaches a latitude of 61°, much farther north than any other of its kind. In favored glades of the forests in the Rocky Mountains and the Sierras during the migration this and other species of hummers are to be seen literally by hundreds. The rufous hummer has temper and courage to match its fiery hues, and spends no small part of its time doing battle with its fellows. The contestants after several fierce rounds fly away not only fit, but eager for another fray on the first occasion. In addition to the nectar of flowers, its standard fare, this hummer includes in its diet "honey dew," the sugary secretion of plant lice which is deposited on vegetation. Like all other hummers, it eats large numbers of minute insects which it finds inside the flowers. It is interesting to note that hummingbirds discover the flowers they frequent by sight alone, and any bit of bright color in the distance is sure to attract their notice, as a bright red handkerchief on a bush or about the neck. More than once I have observed them poising within a few inches of my head, evidently endeavoring to ascertain the nature of the red handkerchief I wore.

ROAD RUNNER (Geococcyx californianus)

Length, 20 to 24 inches, mostly tail. Quite unlike any other North American bird in form and color.

Range: From the upper Sacramento Valley south through California and the peninsula and from Colorado, Kansas, middle and western Texas, Arizona and New Mexico southward; resident.

The name "road runner" when applied to a cuckoo may seem an anomaly to those who know only our eastern cuckoos, but in truth the road runner is anomalous in many ways. It is distinguished by curiously marked plumage, the possession of a long bill and a disproportionally long tail. As a result of its strange appearance, and stranger antics, the road runner is made the hero of many a fable. Among other wonders, it is claimed that it can outrun the swiftest horse and kill the biggest rattlesnake. It is said to accomplish the latter feat by surrounding the reptile while asleep with a rampart of cactus spines on which the enraged reptile accommodatingly impales itself.

The truth is that when in a hurry this ground cuckoo can run with great speed, though as yet no official record of its best time has been made. Its food consists of a great variety of harmful insects — mice, lizards, and small snakes.









Ruby-throated Hummingbird
Male, upper; female, lower
Whip-poor-will

Rufous Hummingbird
Male, upper; female, lower
Roadrunner



Photograph by Robert E. Coker

PELICANS ON THE LOBOS DE AFUEVA ISLANDS, PERU

It was estimated by Mr. Coker that there were upward of 100,000 pelicans, all told, on the eastward island of the Lobos de Afuevas. At the time of the writer's next visit there he saw scarcely any birds near the old rookery. It is one of the tragedies of the guano industry that this important bird has received so little consideration.



Photograph by Robert C. Coker

ONE HUNDRED THOUSAND PELICANS

Such an array of big gray birds makes a more showy effect than a vastly greater number of smaller birds. Unfortunately, this great and valuable rookery, undisturbed for several years, was not permitted to remain undisturbed



Mocking Bird



Brown Thrasher

MOCKING BIRD (Mimus polyglottos)

Length, 10 inches. Most easily distinguished from the similarly colored loggerhead shrike (see p. 679) by the absence of a conspicuous black stripe through the eye.

Range: Resident from southern Mexico north to California, Wyoming, Iowa, Ohio, and Maryland; casual farther north.

Habits and economic status: Because of its incomparable medleys and imitative powers, the mocking bird is the most renowned singer of the Western Hemisphere. Even in confinement it is a masterly performer, and formerly thousands were trapped and sold for cage birds; but this reprehensible practice has been largely stopped by protective laws. It is not surprising, therefore, that the mocking bird should receive protection principally because of its ability as a songster and its preference for the vicinity of dwellings. Its place in the affections of the South is similar to that occupied by the robin in the North. It is well that this is true, for the bird appears not to earn protection from a strictly economic standpoint. About half of its diet consists of fruit, and many cultivated varieties are attacked, such as oranges, grapes, figs, strawberries, blackberries, and raspberries. Somewhat less than a fourth of the food is animal matter, and grasshoppers are the largest single element. The bird is fond of cotton worms, and is known to feed also on the chinch-bug, rice weevil, and bollworm.

BROWN THRASHER (Toxostoma rufum)

Length, about 11 inches. Brownish red above, heavily streaked with black below.

Range: Breeds from the Gulf States to southern Canada and west to Colorado, Wyoming, and Montana; winters in the southern half of the eastern United States.

Habits and economic status: The brown thrasher is more retiring than either the mocking bird or catbird, but like them is a splendid singer. Not infrequently indeed its song is taken for that of its more famed cousin, the mocking bird. It is partial to thickets and gets much of its food from the ground. Its search for this is usually accompanied by much scratching and scattering of leaves; whence its common name. Its call note is a sharp sound like the smacking of lips, which is useful in identifying this long-tailed, thicket-haunting bird, which does not much relish close scrutiny. The brown thrasher is not so fond of fruit as the catbird and mocker, but devours a much larger percentage of animal food. Beetles form one-half of the animal food, grasshoppers and crickets one-fifth, caterpillars, including cutworms, somewhat less than one-fifth, and bugs, spiders, and millepeds comprise most of the remainder. By its destruction of these and other insects, which constitute more than 60 per cent of its food, the thrasher much more than compensates for that portion (about one-tenth) of its diet derived from cultivated crops.



MOTHER IS TAKING NO CHANCES OF LETTING HER LITTLE ONE SPILL ON ITS CLEAN DRESS: A BROWN THRASHER FEEDING ITS YOUNG









GREAT HORNED OWL
COOT

WOOD DUCK
Male, upper; female, lower
SPOTTED SANDPIPER

GREAT HORNED OWL (Bubo virginianus and subspecies)

Length, about 22 inches. The great size and long ear tufts sufficiently distinguish this owl.

Range: Resident over the greater part of North and South America.

This, our largest owl, inhabits heavily forested and unsettled regions and is becoming more and more rare in thickly populated areas. It is well known by its far-reaching call—"hoo-hoo-hoo-hoo"—which is heard best in the still small hours of the night, when it echoes across the expanse of canyon and forest in the far west.

This owl destroys many partridges and other game birds, and unhoused poultry is never safe from its nocturnal attacks. Its deeds are those of darkness, since usually it hunts only at night, though when disturbed in the daytime it can see well enough to take good care of itself. Its bill of fare is a long one and includes many kinds of mammals and birds. It is one of the few creatures which when hungry do not hesitate to attack the skunk, and it appears to have no great difficulty in killing this rather formidable little beast. That it does not always do so with entire impunity is evident from the odor frequently attaching to its feathers. Its destruction of rodents entitles it to our gratitude, especially when it kills pocket gophers, rats, mice, ground squirrels, and rabbits.

COOT (Fulica americana)

Length, about 15 inches. The slate-colored plumage, with blackish head and neck, white bill, and scalloped toes mark this bird apart from all others.

Range: Breeds from southern Canada south to Lower California, Texas, Tennessee, and New Jersey; also in southern Mexico and Guatemala; winters from southern British Columbia, Nevada, Utah, Ohio Valley, and Virginia south to Panama.

The coot, or mud-hen, is a sort of combination of duck, gallinule, and rail, and withal is a very interesting bird. Fortunately for the coot, its flesh is little esteemed, and by many, indeed, is considered unfit for human consumption. The coot is thus passed by in contempt by most sportsmen, and in some regions it is as tame as can well be imagined, swimming within a few feet of the observer with entire unconcern. Under other circumstances, however, as in Louisiana, where it is shot for food under the name *poule d'eau*, it becomes as wild as the most wary of ducks. It frequents both salt and fresh water, preferably the latter. The mud-hen is one of the few American birds that occasionally visits the distant Hawaiian Islands in fall and winter. Finding conditions there to their liking, some of the immigrants, probably centuries ago, elected to remain and found a new colony, and there, in the fresh-water ponds of the island archipelago, their descendants still live and thrive.

The food of the coot consists almost entirely of water plants of no use to man. There would seem, therefore, to be no excuse for killing or disturbing the bird in any way.

WOOD DUCK (Aix sponsa)

Length, about 19 inches. The elongated crest of feathers and variegated plumage of white and brown, spotted with chestnut, ochraceous, and steel blue, are characteristic.

Range: Breeds from Washington to middle California, and from Manitoba and southeastern Canada to Texas and Florida; winters chiefly in the United States.

It can be said of this duck, as of no other, that it is our very own, since most of the breeding area it occupies is within our territory, and by far the greater number of the species winter within the United States. The story of its former abundance on our ponds and streams and of its present scarcity is a sad commentary on our improvidence and a warning for the future. Happily, it is not yet too late to save this most beautiful of our ducks, and under proper regulations it may be expected not only to hold its own, but to increase until it is once more a proper object for the skill of sportsmen. Under present conditions all true sportsmen should refrain from its further pursuit.

As is well known, the wood duck is one of the few wildfowl that builds its nest in hollow trees, and the security thus provided for the young is one of the factors to be relied upon for the increase of the species. North, south, east, and west, the States of every section are, or should be, interested in the preservation of this distinctively American duck, and should make suitable regulations for its welfare and see to their enforcement.

SPOTTED SANDPIPER (Actitis macularia)

Length, about 6 inches. The "tip up," with its brownish gray upper parts and white under parts and its teetering motion, is too well known to need description.

Range: Breeds in northwestern Alaska and in much of northern Canada south to southern California, Arizona, southern Texas, southern Louisiana, and northern South Carolina; winters from California, Louisiana, and South Carolina to southern Brazil and Peru.

The little "tip up," as it is appropriately named, from its quaint nodding motion, unduly favors no one section or community, but elects to dwell in every region suited to its needs from Alaska to Florida. It is doubtless more widely known than any other of our shore birds, and as it takes wing when disturbed, its "wit, wit" comes to us from beach, river side, and mill pond, from one end of the land to the other. It is the only shore bird that habitually nests in cornfields and pastures, and its handsome buff eggs spotted with chocolate are well known to the farmer's boy everywhere. Much is to be said in favor of the food habits of the little tip up, as the bird includes in its diet army worms, squash bugs, cabbage worms, grasshoppers, green flies, and crayfishes. Having thus earned a right to be numbered among the farmers' friends, the bird should be exempt from persecution.



YELLOW-HEADED BLACKBIRD
Male, upper; female, lower
STARLING

COWBIRD
Male, upper; female, lower
CHIMNEY SWIFT

YELLOWHEAD (Xanthocephalus xanthocephalus)

Length, about 10 inches. Our only blackbird with a yellow head.

Range: Confined to western North America. Breeds from southern British Columbia, southern Mackenzie, southwestern Keewatin, and northern Minnesota to southern California and Arizona, east to southern Wisconsin, Illinois, and Indiana; winters from southwestern California, southern Arizona, southeastern Texas, and southwestern Louisiana south into Mexico.

Apparently Nature started out with the intention of making an oriole, but decided to make a blackbird instead—and behold the yellowhead. He is a sociable chap and nests in great companies in the tule swamps of the west. The yellowhead's voice is harsh and guttural and his vocal efforts have been well characterized as a maximum of earnest effort with a minimum of harmony. Late in midsummer when the young are on the wing, old and young betake themselves to the uplands, grain fields, pastures, and corrals, associating as often as not with redwings and Brewer's blackbirds. The yellowhead feeds principally upon insects, grain, and weed seed, and does not attack fruit or garden produce; but it does much good by eating noxious insects and troublesome weeds; where too abundant it is likely to be injurious to grain.

STARLING (Sturnus vulgaris)

Length, about 8½ inches. General color dark purple or green with reflections; feathers above tipped with creamy buff. In flight and general appearance unlike any native species.

Range: At present most numerous near New York City. Has spread to Massachusetts, Connecticut, New Jersey, Pennsylvania, Maryland, Virginia, and recently to the District of Columbia; resident where found, though wandering southward in winter in search of food.

The Old World has sent us two bird pests—the English sparrow and the starling. Although, up to the present time, we cannot convict the starling of having done any great damage he has proclivities which make him potentially very dangerous. Introduced into New York in 1890, the original sixty have multiplied many fold and spread in all directions till now they occupy territory hundreds of miles square, and are multiplying and spreading faster than ever. On the north they have entered Massachusetts and Connecticut, and on the south they have reached Richmond, though only in migration. Even as I write the calls of a flock of 200 or more can be heard coming from a neighboring park, but as yet the bird has not elected to summer in the National Capital. The starling is a hardy, prolific bird and is also aggressive. Like the English sparrow it associates in flocks, which is a great advantage in bird disputes. There is little doubt that the effect of its increase and spread over our country will prove disastrous to native species, such as the bluebirds, crested flycatchers, swallows, wrens, and flickers, all valuable economic species, which nest in cavities as does the starling.

COWBIRD (Molothrus ater)

Length, about 8 inches. Male glossy black, head, neck, and breast brown. Female brownish gray.

Range: Breeds from southern British Columbia, southern Mackenzie, and southeastern Canada south to northern California, Nevada, northern New Mexico, Texas, Louisiana, and North Carolina; winters from southeastern California and the Ohio and Potomac valleys to the Gulf and to central Mexico.

Chapman calls the cowbird a villain—but is not the villain in the piece often the most interesting character on the stage? Thus our cowbird, short as he is of manners and morals, cannot fail to interest the bird lover. He is full of idiosyncrasies that keep one guessing. Why, for instance, his close association with the peaceful cow? Why his ludicrous attempts to sing, he who has not a thread of music in his whole make-up? How did Madame Cowbird come to lapse from the paths of virtue and, in place of building a nest of her own, foist her eggs and the care of her offspring on smaller and better principled birds to their detriment?

CHIMNEY SWIFT (Chætura pelagica)

Length, rather less than 5½ inches. Too well known by its peculiar flight and habits to need describing.

Range: Known only in eastern North America. Breeds from southeastern Saskatchewan, Manitoba, Quebec, and Newfoundland south to Gulf coast; west to Plains from eastern Montana to eastern Texas; winters south of the United States.

The popular name of this bird, chimney swallow, embodies an error, since the bird not only is not a swallow, but is not even distantly related to the swallow family. Unlike the hummingbirds as the chimney swift is in appearance and habits, it is structurally not far removed from them. Like the swallows it is an indefatigable skimmer of the air, and like them it earns a debt of gratitude by destroying vast numbers of our winged enemies, which its unsurpassed powers of flight enable it to capture. Indeed, chimney swifts eat nothing but insects, and no insect that flies is safe from them, unless it be too large for them to swallow. In June swifts may be seen gathering twigs for nest material. They disdain to pick these up from the ground, but seize the coveted twig with their strong feet and break it off from the terminal branch when in full flight. By means of a sticky saliva secreted for the purpose the swift glues these twigs to the sides of the chimney in the form of a shallow nest. Although not generally known, swifts roost in chimneys and cling to the walls by using the sharp-pointed tail as a prop, as do many woodpeckers in ascending trees. Any bird lover may secure distinction by solving an ornithological riddle and telling us where our chimney swifts spend the winter. They come in spring, they go in fall, and at present that is about all we know of the matter, save that they do not hibernate in hollow trees, as many have believed.









Black-crowned Night Heron
Male, upper; young bird, lower

Herring Gull
Adult in winter, upper
Adult in summer, lower

Great Blue Heron
Common Tern

BLACK-CROWNED NIGHT HERON (Nycticorax nævius nævius)

Length, about 24 inches. The black crown distinguishes it from its relative, the yellow-crowned night heron.

Range: Breeds from northern Oregon, southern Wyoming, southern Manitoba, and central Quebec south to Patagonia; winters from northern California and Gulf States southward.

Given for a roosting place a suitable stand of leafy trees, especially evergreens, conveniently near a stream or pond that harbors fish, frogs, and tadpoles, and any locality may have its colony of night herons. As its name implies, this heron is a bird of the night, not leaving its roost till dusk, when, with frequent iteration of its hoarse quawk, it wings its way in the gathering gloom straight to its feeding place. So rarely is the bird about in daylight that a large colony may exist for years near a town or large city and not above a dozen individuals have an inkling of its existence. True to its sociable instincts, the night heron by preference nests in colonies, and several pairs often place their rude nests of sticks in the same tree; or, in the absence of trees, as in the extensive tule swamps of the far west, where other conditions are ideal for herons, they nest on the ground or on the prostrate tules, hundreds of pairs being associated together.

This heron sometimes feeds on field mice, but it eats too many fish to please the fish-culturist, and after it has once learned the way to a hatchery strong measures are needed to discourage its activities.

HERRING GULL (Larus argentatus)

Length, about 24 inches. Deep pearl gray above; much of rest of plumage white. Not readily distinguished in life from its allies.

Range: Breeds in Alaska and in Arctic regions south to southern British Columbia, southern Alberta, northern North Dakota, central Wisconsin, southern Ontario, northern New York, and Maine; winters from southern British Columbia to Lower California and western Mexico, and from Gulf of St. Lawrence and Great Lakes south to Bahamas, Yucatan, and coast of Texas.

All things considered, the herring gull is probably the best known of the family by reason of its abundance and wide distribution. Moreover, this is the gull most frequently noticed by passengers as it follows in the wake of our ocean and trans-Atlantic steamers. It breeds no farther south than the coast of Maine, but in winter it is very numerous along the Atlantic coast and in many of our inland ponds. It does excellent service as a scavenger in our harbors, venturing fearlessly among the shipping to secure anything edible that may find its way overboard. The services of this and other gulls in such a capacity are so valuable that their destruction under any pretense is to be deprecated. When the craze for feathered hat gear was at its height thousands of gulls, without regard to species, were killed for millinery purposes; but now that the sale of their feathers is illegal practically everywhere in the United States, the gulls are rapidly increasing.

GREAT BLUE HERON (Ardea herodias and subspecies)

Length, from 42 to 50 inches.

Range: Breeds from the southern Canadian provinces south to southern Lower California, southern Mexico, and South Atlantic States; winters from Oregon, the Ohio Valley, and Middle States south to the West Indies, Panama, and Venezuela.

When one sees a large bluish bird, with long neck and stilt-like legs, standing motionless by river, pond, or lake, or slowly wading in the shallows, he may be sure he has before him the great blue heron, and a notable bird he is in many ways. Wary as this heron is and keen to scent danger, he offers so tempting a mark as he wings his way slowly along, with head and neck drawn in against the body and long legs trailing behind, or as he stands motionless watching for game, that he is frequently shot "just for the fun of it." This wanton taking of life is never justifiable, but when the life cut short represents so much beauty and grace as are embodied in this stately bird the crime seems doubly heinous. Naturally this heron is much less common than he used to be.

Small fish, frogs, tadpoles, and snakes form the bulk of his food, and in some regions he is a determined foe of mice and gophers, and the sight of a heron in the midst of a dry pasture or in a stubble field watching for a gopher to emerge from his hole is very common.

COMMON TERN (Sterna hirundo)

Length, about 15 inches. The pearl-gray breast and belly distinguish the adult of this tern from its relatives. The outer web of the outer tail feathers is darker than the inner web; the reverse is true of Forster's tern, its nearest ally.

Range: Breeds from Great Slave Lake, central Keewatin, and southern Quebec south to southwestern Saskatchewan, northern North Dakota, southern Wisconsin, northern Ohio, and North Carolina; winters from Florida to Brazil.

Our common tern is, alas, common no longer. The Atlantic coast is peculiarly fitted to be the home of the terns by reason of the extensive shallows and the great number of sandy islands on which terns and gulls used to breed in absolute safety. At the bidding of fashion, however, thousands of these beautiful creatures were slaughtered, till the sand was red with their blood and island colonies that used to number thousands were exterminated. No excuse serves to palliate the crime of the wholesale murder of these graceful sea swallows, as they are aptly termed, which used to make our shores so attractive by their presence. But the tide seems to have turned, partly at least. The government has set aside islands as breeding resorts and places of refuge and, through the activity of Audubon societies and of individual workers, a certain measure of safety seems now assured to these persecuted birds. It may even prove possible, by the bird sanctuary plan, to increase their numbers again and make them a familiar sight along our deserted shores.





Sparrow Hawk
Red-tailed Hawk

SPARROW HAWK (Falco sparverius)

Length, about 10 inches. This is one of the best known and handsomest, as well as the smallest, of North American hawks.

Range: Breeds throughout the United States, Canada, and northern Mexico; winters in the United States and south to Guatemala.

Habits and economic status: The sparrow hawk, which is a true falcon, lives in the more open country and builds its nest in hollow trees. It is abundant in many parts of the West, where telegraph poles afford it convenient perching and feeding places. Its food consists of insects, small mammals, birds, spiders, and reptiles. Grasshoppers, crickets, and terrestrial beetles and caterpillars make up considerably more than half its subsistence, while field mice, house mice, and shrews cover fully 25 per cent of its annual supply. The balance of the food includes birds, reptiles, and spiders. Contrary to the usual habits of the species, some individuals during the breeding season capture nestling birds for food for their young and create considerable havoc among the songsters of the neighborhood. In agricultural districts when new ground is broken by the plow, they sometimes become very tame, even alighting for an instant under the horses in their endeavor to seize a worm or insect. Out of 410 stomachs examined, 314 were found to contain insects; 120, small mammals, and 70, small birds. This little falcon renders good service in destroying noxious insects and rodents and should be encouraged and protected.

RED-TAILED HAWK (Buteo borealis)

Length, about 2 feet. One of our largest hawks; adults with tail reddish brown.

Range: Breeds in the United States, Mexico, Costa Rica, Canada, and Alaska; winters generally in the United States and south to Guatemala.

Habits and economic status: The red-tailed hawk, or "hen-hawk," as it is commonly called, is one of the best known of all our birds of prey, and is a widely distributed species of great economic importance. Its habit of sitting on some prominent limb or pole in the open, or flying with measured wing beat over prairies and sparsely wooded areas on the lookout for its favorite prey, causes it to be noticed by the most indifferent observer. Although not as omnivorous as the red-shouldered hawk, it feeds on a variety of food, as small mammals, snakes, frogs, insects, birds, crawfish, centipedes, and even carrion. In regions where rattlesnakes abound it destroys considerable numbers of the reptiles. Although it feeds to a certain extent on poultry and birds, it is nevertheless entitled to general protection on account of the insistent warfare it wages against field mice and other small rodents and insects that are so destructive to young orchards, nursery stock, and farm produce. Out of 530 stomachs examined, 457, or 85 per cent, contained the remains of mammal pests, such as field mice, pine mice, rabbits, several species of ground squirrels, pocket gophers, and cotton rats, and only 62 contained the remains of poultry or game birds.



Photograph by Howard H. Cleaves

RED-SHOULDERED HAWK DEMONSTRATING THE REACH OF ITS LEGS

For experimental purposes a stuffed owl was tied in an upright position and the investigators secreted themselves to await developments. Almost immediately there was an uproar in which every bird in the vicinity took part. A red-shouldered hawk swooped down upon the bait and gave it a vicious jab, while the others were an interested audience perched in adjoining trees around the arena. The attack was repeated until the owl's feathers were almost all pulled out and the excelsior stuffing showed in several places.





Cooper's Hawk
Mourning Dove

COOPER'S HAWK (Accipiter cooperi)

Length, about 15 inches. Medium sized, with long tail and short wings, and without the white patch on rump which is characteristic of the marsh hawk.

Range: Breeds throughout most of the United States and southern Canada; winters from the United States to Costa Rica.

Habits and economic status: The Cooper's hawk, or "blue darter," as it is familiarly known throughout the South, is preëminently a poultry and bird-eating species, and its destructiveness in this direction is surpassed only by that of its larger congener, the goshawk, which occasionally in autumn and winter enters the United States from the North in great numbers. The almost universal prejudice against birds of prey is largely due to the activities of these two birds, assisted by a third, the sharp-shinned hawk, which in habits and appearance might well pass for a small Cooper's hawk. These birds usually approach under cover and drop upon unsuspecting victims, making great inroads upon poultry yards and game coverts favorably situated for this style of hunting. Out of 123 stomachs examined, 38 contained the remains of poultry and game birds, 66 the remains of other birds, and 12 the remains of mammals. Twenty-eight species of wild birds were identified in the above-mentioned material. This destructive hawk, together with its two near relatives, should be destroyed by every possible means.

MOURNING DOVE (Zenaidura macroura)

Length, 12 inches. The dark spot on the side of the neck distinguishes this bird from all other native doves and pigeons except the white-winged dove. The latter has the upper third of wing white.

Range: Breeds throughout the United States and in Mexico, Guatemala, and southern Canada; winters from the central United States to Panama.

Habits and economic status: The food of the mourning dove is practically all vegetable matter (over 99 per cent), principally seeds of plants, including grain. Wheat, oats, rye, corn, barley, and buckwheat were found in 150 out of 237 stomachs, and constituted 32 per cent of the food. Three-fourths of this was waste grain picked up after harvest. The principal and almost constant diet is weed seeds, which are eaten throughout the year and constitute 64 per cent of the entire food. In one stomach were found 7,500 seeds of yellow wood sorrel, in another 6,400 seeds of barn grass or foxtail, and in a third 2,600 seeds of slender paspalum, 4,820 of orange hawkweed, 950 of hoary vervain, 120 of Carolina cranesbill, 50 of yellow wood sorrel, 620 of panic grass, and 40 of various other weeds. None of these are useful, and most of them are troublesome weeds. The dove does not eat insects or other animal food. It should be protected in every possible way.



Photograph by Dr. C. William Beebe

THE DANDY AMONG BIRDS

The Mexican mot-mot is perhaps the only bird that mutilates its tail-feathers for purposes of decoration after they are full-grown. A portion of the shafts is denuded by the bird, leaving the web at the tips to form a conspicuous racket.





RUFFED GROUSE
BOBWHITE

RUFFED GROUSE (Bonasa umbellus)

Length, 17 inches. The broad black band near tip of tail distinguishes this from other grouse.

Range: Resident in the northern two-thirds of the United States and in the forested parts of Canada.

Habits and economic status: The ruffed grouse, the famed drummer and finest game bird of the northern woods, is usually wild and wary and under reasonable protection well withstands the attacks of hunters. Moreover, when reduced in numbers, it responds to protection in a gratifying manner and has proved to be well adapted to propagation under artificial conditions. Wild fruit, mast, and browse make up the bulk of the vegetable food of this species. It is very fond of hazelnuts, beechnuts, chestnuts, and acorns, and it eats practically all kinds of wild berries and other fruits. Nearly 60 kinds of fruits have been identified from the stomach contents examined. Various weed seeds also are consumed. Slightly more than 10 per cent of the food consists of insects, about half being beetles. The most important pests devoured are the potato beetle, clover-root weevil, the pale-striped flea beetle, grapevine leaf-beetle, May beetles, grasshoppers, cotton worms, army worms, cutworms, the red-humped apple worm, and sawfly larvæ.

BOBWHITE (Colinus virginianus)

Length, 10 inches. Known everywhere by the clear whistle that suggests its name.

Range: Resident in the United States east of the plains; introduced in many places in the West.

Habits and economic status: The bobwhite is loved by every dweller in the country and is better known to more hunters in the United States than any other game bird. It is no less appreciated on the table than in the field, and in many States has unquestionably been hunted too closely. Fortunately it seems to be practicable to propagate the bird in captivity, and much is to be hoped for in this direction. Half the food of this quail consists of weed seeds, almost a fourth of grain, and about a tenth of wild fruits. Although thus eating grain, the bird gets most of it from stubble. Fifteen per cent of the bobwhite's food is composed of insects, including several of the most serious pests of agriculture. It feeds freely upon Colorado potato beetles and chinch bugs; it devours also cucumber beetles, wireworms, billbugs, clover-leaf weevils, cotton-boll weevils, army worms, bollworms, cutworms, and Rocky Mountain locusts. Bobwhite is very useful to the farmer, and while it may not be necessary to remove it from the list of game birds every farmer should see that his own farm is not depleted by eager sportsmen.



A RUFFED GROUSE ABOUT TO DRUM

Of all the characteristics of this superb game bird, its habit of drumming is perhaps the most remarkable. This loud tattoo begins with the measured thump of the big drum, then gradually changes and dies away in the rumble of the kettle-drum. It may be briefly represented thus: *Thump—thump—thump, thump, thump, thump, thump, thump, r-r-r-r-r-r-r-r-r-r.* The sound is produced by the male bird beating the air with his wings as he stands firmly braced on some favorite log or stump; and it is now quite well known to be the call of the male to the female—an announcement that he is at the old rendezvous.









KINGFISHER
RED-HEADED WOODPECKER

RED-SHAFTED FLICKER
CALIFORNIA WOODPECKER

KINGFISHER (Ceryle alcyon)

Length, about 13 inches. Not to be confused with any other American bird.

Range: Breeds from northwestern Alaska and central Canada south to the southern border of the United States; winters from British Columbia, Nebraska, Illinois, Indiana, Ohio, and Virginia south to the West Indies, Colombia, and Guiana.

The cry of the kingfisher, which suggests a watchman's rattle in vigorous hands, can be mistaken for the note of no other bird; nor, for that matter, is the bird himself likely to be confused with any other species. Whether flying, perched on a branch over a stream, or diving for small fish, our kingfisher is always himself, borrowing none of his peculiarities from his neighbors. Many of his tropical brothers catch insects for a living; but our bird, early in the history of the development of the kingfisher family, discovered that fish were easier to catch and in the long run more filling than insects, and hence renounced the family habit and assumed the rôle of fisherman. Instead of using a hollow tree as a nest site, the kingfisher has apparently learned a lesson from the sandswallows and excavates a burrow for himself in some sandbank, usually not far from pond or stream; and you may be sure that any pond chosen by him for a haunt is well stocked with fish.

RED-HEAD (Melanerpes erythrocephalus)

Length, about 9¾ inches. Our only woodpecker with red head and broad white wing patch.

Range: From southern Canada to the Gulf Coast and from central Montana, central Colorado, and central Texas to the Hudson and Delaware. Generally resident, but more or less migratory in the southern parts of its range.

This strikingly marked and readily identified woodpecker is common in some localities and entirely wanting in others, which apparently are equally well adapted to the bird's needs. Its habits are a combination of woodpecker, jay, and flycatcher, and catching insects on the wing is a common habit. Though in general migratory, the bird is apparently indifferent to cold and other weather conditions, and winters wherever food abounds, especially where beechnuts, of which it is very fond, are plentiful. The red-head eats nearly twice as much vegetable food as it does animal, but the latter includes many destructive insects. For instance, it is greatly to its credit that it eats both species of clover beetles, the corn weevil, cherry scale, and 17-year cicada. On the other hand, vigorous accusations are not wanting from various parts of the country of damage done by this species. It eats corn on the ear, and attacks many kinds of small fruits, including strawberries and apples. It is also guilty of robbing the nests of wild birds of both eggs and nestlings. It does some damage to telegraph poles by boring into them to make nests. No doubt some of these charges are well founded. For the most part they represent the occasional acts of individuals, or are local and not characteristic of the species as a whole.

RED-SHAFTED FLICKER (Colaptes cafer collaris)

Length, 12 to 14 inches. To be distinguished from its eastern relative (*C. auratus*) by its red mustache and nuchal band and the red wing and tail shafts.

Range: Rocky Mountain region from British Columbia south to Mexico, west to the coast mountains in Oregon and Washington, and through California; largely resident.

Few birds are more widely known than the flicker, as appears from the fact, recorded by Chapman, that in the various parts of the country it appears under no fewer than 124 aliases. Though well known, the flicker is more often heard than seen, its loud call often proclaiming its presence when it is hidden among the trees. As a rule the flicker is shy, and in some sections of the country it has good reason to be, since it is accounted a game bird and, as such, pursued for the table.

Though a woodpecker, the red-shaft departs widely from typical members of the tribe both in structure and habits. Notwithstanding the fact that its bill is not well adapted for boring into wood for larvæ, the bird manages to do considerable damage in the West by making holes, in church steeples, school-houses, and other buildings, to serve as roosting quarters. As it is nowise particular as to its domicile, it is possible materially to increase its numbers by putting up nesting boxes for its accommodation. The bird's subsistence is obtained largely from the ground, where it secures vast quantities of ants, for taking which its tongue is specially adapted; about one-half its food, in fact, consists of these creatures.

CALIFORNIA WOODPECKER (Melanerpes formicivorus and races)

Length, about 9¼ inches. Easily distinguished from its fellows by its general black color, white forehead, throat patch, belly and wing patch.

Range: Breeds from northwestern Oregon, California, Arizona, and New Mexico south through Lower California to Costa Rica.

The California woodpecker is a noisy, frolicsome bird and by all odds the most interesting of our woodpeckers. Its range seems to be determined by that of the oaks upon which it lives and from which it draws a large part of its subsistence. In California the bird is known to many by the Spanish name, *carpintero*, or carpenter, and its shop is the oak, in the dead limbs of which, as in the bark of pines, it bores innumerable holes, each just large enough to receive an acorn. That the birds do not regard the filling of these storehouses as work, but, on the contrary, take great pleasure in it, is evident from their joyous outcries and from the manner they chase each other in their trips from tree to tree like boys at tag. In California many of the country school-houses are unoccupied during the summer and the woodpeckers do serious damage by drilling holes in the window casings and elsewhere with a view to using them as storage places. As long as the acorn crop lasts, so long does the storing work go on. Meanwhile the jays and squirrels slip in and rob the woodpecker's larder.



Bobolink



Common Crow

BOBOLINK (Dolichonyx oryzivorus)

Length, about 7 inches.

Range: Breeds from Ohio northeast to Nova Scotia, north to Manitoba, and northwest to British Columbia; winters in South America.

Habits and economic status: When American writers awoke to the beauty and attractiveness of our native birds, among the first to be enshrined in song and story was the bobolink. Few species show such striking contrasts in the color of the sexes, and few have songs more unique and whimsical. In its northern home the bird is loved for its beauty and its rich melody; in the South it earns deserved hatred by its destructiveness. Bobolinks reach the southeastern coast of the United States the last half of April, just as rice is sprouting, and at once begin to pull up and devour the sprouting kernels. Soon they move on to their northern breeding grounds, where they feed upon insects, weed seeds, and a little grain. When the young are well on the wing, they gather in flocks with the parent birds and gradually move southward, being then generally known as reed birds. They reach the rice fields of the Carolinas about August 20, when the rice is in the milk. Then until the birds depart for South America planters and birds fight for the crop, and in spite of constant watchfulness and innumerable devices for scaring the birds a loss of 10 per cent of the rice is the usual result.

COMMON CROW
(Corvus brachyrhynchos)

Length, 19 inches.

Range: Breeds throughout the United States and most of Canada; winters generally in the United States.

Habits and economic status: The general habits of the crow are universally known. Its ability to commit such misdeeds as pulling corn and stealing eggs and fruit and to get away unscathed is little short of marvelous. Much of the crow's success in life is due to coöperation, and the social instinct of the species has its highest expression in the winter roosts, which are sometimes frequented by hundreds of thousands of crows. From these roosts daily flights of many miles are made in search of food. Injury to sprouting corn is the most frequent complaint against the species, but by coating the seed grain with coal tar most of this damage may be prevented. Losses of poultry and eggs may be averted by proper housing and the judicious use of wire netting. The insect food of the crow includes wireworms, cutworms, white grubs, and grasshoppers, and during outbreaks of these insects the crow renders good service. The bird is also an efficient scavenger. But chiefly because of its destruction of beneficial wild birds and their eggs the crow must be classed as a criminal, and a reduction in its numbers in localities is justifiable.



Photograph by W. C. Tobin

ALL ABOARD!

The first venture of these little swans upon the stormy seas of life is safely negotiated upon their mother's back, while she, with a true mother's pride in her offspring, takes every care that no harm shall come.



Meadowlark



Red-winged Blackbird

MEADOWLARKS (Sturnella magna and Sturnella neglecta)

Length, about 10¾ inches.

Range: Breed generally in the United States, southern Canada, and Mexico to Costa Rica; winter from the Ohio and Potomac valleys and British Columbia southward.

Habits and economic status: Our two meadowlarks, though differing much in song, resemble each other closely in plumage and habits. Grassy plains and uplands covered with a thick growth of grass or weeds, with near-by water, furnish the conditions best suited to the meadowlark's taste. The song of the western bird is loud, clear, and melodious. That of its eastern relative is feebler and loses much by comparison. In many localities the meadowlark is classed and shot as a game bird. From the farmer's standpoint this is a mistake, since its value as an insect eater is far greater than as an object of pursuit by the sportsman. Both the boll weevil, the foe of the cotton grower, and the alfalfa weevil are among the beetles it habitually eats. Twenty-five per cent of the diet of this bird is beetles, half of which are predaceous ground beetles, accounted useful insects, and one-fifth are destructive weevils. Caterpillars form 11 per cent of the food and are eaten in every month in the year. Among these are many cutworms and the well-known army worm. Grasshoppers are favorite food and are eaten in every month and almost every day. The vegetable food (24 per cent of the whole) consists of grain and weed seeds.

RED-WINGED BLACKBIRD (Agelaius phœniceus)

Length, about 9½ inches.

Range: Breeds in Mexico and North America south of the Barren Grounds; winters in southern half of United States and south to Costa Rica.

Habits and economic status: The prairies of the upper Mississippi Valley, with their numerous sloughs and ponds, furnish ideal nesting places for redwings, and consequently this region has become the great breeding ground for the species. These prairies pour forth the vast flocks that play havoc with grain fields. East of the Appalachian Range, marshes on the shores of lakes, rivers, and estuaries are the only available breeding sites and, as these are comparatively few and small, the species is much less abundant than in the West. Redwings are eminently gregarious, living in flocks and breeding in communities. The food of the redwing consists of 27 per cent animal matter and 73 per cent vegetable. Insects constitute practically one-fourth of the food. Beetles (largely weevils, a most harmful group) amount to 10 per cent. Grasshoppers are eaten in every month and amount to about 5 per cent. Caterpillars (among them the injurious army worm) are eaten at all seasons and aggregate 6 per cent. Ants, wasps, bugs, flies, dragonflies, and spiders also are eaten. The vegetable food consists of seeds, including grain, of which oats is the favorite, and some small fruits. When in large flocks this bird is capable of doing great harm to grain.



Photograph by [illegible]

THE SLACKER OF BIRDDOM EXPOSED

This is a picture of the nest of Mr. and Mrs. Yellow-breasted Chat, and the majority of the eggs belong to the lady of the house; but she has been imposed upon in her absence and made the victim of the indolence of her neighbor, Mrs. Cowbird, who has laid an egg in the Chat nest for Mrs. Chat to incubate with her own. Mrs. Cowbird, relieved of the responsibility of bringing up her offspring, is probably off indulging in some frivolity. This parasitic habit is a characteristic of the cowbird. The darker egg is the alien [illegible]



Downy Woodpecker



Yellow-billed Cuckoo

DOWNY WOODPECKER (Dryobates pubescens)

Length, 6 inches. Our smallest woodpecker; spotted with black and white. Dark bars on the outer tail feathers distinguish it from the similarly colored but larger hairy woodpecker.

Range: Resident in the United States and the forested parts of Canada and Alaska.

Habits and economic status: This woodpecker is commonly distributed, living in woodland tracts, orchards, and gardens. The bird has several characteristic notes, and, like the hairy woodpecker, is fond of beating on a dry resonant tree branch a tattoo which to appreciative ears has the quality of woodland music. In a hole excavated in a dead branch the downy woodpecker lays four to six eggs. This and the hairy woodpecker are among our most valuable allies, their food consisting of some of the worst foes of orchard and woodland, which the woodpeckers are especially equipped to dig out of dead and living wood. In the examination of 723 stomachs of this bird, animal food, mostly insects, was found to constitute 76 per cent of the diet and vegetable matter 24 per cent. The animal food consists largely of beetles that bore into timber or burrow under the bark. Caterpillars amount to 16 per cent of the food and include many especially harmful species.

YELLOW-BILLED CUCKOO (Coccyzus americanus)

Length, about 12 inches. The yellow lower part of the bill distinguishes this bird from its near relative, the black-billed cuckoo.

Range: Breeds generally in the United States and southern Canada; winters in South America.

Habits and economic status: This bird lives on the edges of woodland, in groves, orchards, parks, and even in shaded village streets. It is sometimes known as rain crow, because its very characteristic notes are supposed to foretell rain. The cuckoo has sly, furtive ways as it moves among the bushes or flits from tree to tree, and is much more often seen than heard. Unlike its European relative, it does not lay its eggs in other birds' nests, but builds a nest of its own. This is, however, a rather crude and shabby affair—hardly more than a platform of twigs sufficient to hold the greenish eggs. The cuckoo is extremely useful because of its insectivorous habits, especially as it shows a marked preference for the hairy caterpillars, which few birds eat. One stomach that was examined contained 250 American tent caterpillars; another, 217 fall webworms. In places where tent caterpillars are abundant they seem to constitute a large portion of the food of this and the black-billed cuckoo.



A TWO-STORY BIRD NEST

The nests of giant tropical orioles, or caciques, in Mexico are pendant structures 3 and 4 feet in length. They are usually built out on the very tips of slender branches, so that they are protected from the attacks of arboreal beasts of prey. Often, as in the above photograph, there is a little subsidiary chamber at the summit, which is used by the male bird as a roosting place when his mate is sitting on the eggs below.



FLICKER



YELLOW-BELLIED SAPSUCKER

FLICKER (Colaptes auratus)

Length, 13 inches. The yellow under surface of the wing, yellow tail shafts, and white rump are characteristic.

Range: Breeds in the eastern United States west to the plains and in the forested parts of Canada and Alaska; winters in most of the eastern United States.

Habits and economic status: The flicker inhabits the open country rather than the forest and delights in park-like regions where trees are numerous and scattered. It nests in any large cavity in a tree and readily appropriates an artificial box. It is possible, therefore, to insure the presence of this useful bird about the farm and to increase its numbers. It is the most terrestrial of our woodpeckers and procures much of its food from the ground. The largest item of animal food is ants, of which the flicker eats more than any other common bird. Ants were found in 524 of the 684 stomachs examined and 98 stomachs contained no other food. One stomach contained over 5,000 and two others held over 3,000 each. While bugs are not largely eaten by the flicker, one stomach contained 17 chinch bugs. Wild fruits are next to ants in importance in the flicker's dietary. Of these sour gum and wild black cherry stand at the head. The food habits of this bird are such as to recommend it to complete protection.

YELLOW-BELLIED SAPSUCKER (Sphyrapicus varius)

Length, about 8½ inches. Only woodpecker having top of head from base of bill red, combined with a black patch on breast.

Range: Breeds in northern half of the United States and southern half of Canada; winters in most of the States and south to Costa Rica.

Habits and economic status: The yellow-bellied sapsucker is rather silent and suspicious and generally manages to have a tree between himself and the observer. Hence the bird is much better known by its works than its appearance. The regular girdles of holes made by this bird are common on a great variety of trees; in all about 250 kinds are known to be attacked. Occasionally young trees are killed outright, but more loss is caused by stains and other blemishes in the wood which result from sapsucker punctures. These blemishes, which are known as bird pecks, are especially numerous in hickory, oak, cypress, and yellow poplar. The two principal components of the vegetable food are wild fruits of no importance and cambium (the layer just beneath the bark of trees). In securing the cambium the bird does the damage above described. The yellow-bellied sapsucker, unlike other woodpeckers, thus does comparatively little good and much harm.



Photograph by [illegible]

SAP BASINS MADE IN BARK BY A SAPSUCKER

The regularity of the holes shows that this bird is methodical. The basins were made in six weeks, probably by one bird, and served not only to collect sap, but also to catch flies attracted by the sweet fluid.



OSPREY



BALD EAGLE. Male, upper; immature, lower

OSPREY (Pandion haliætus carolinensis)

Length, about 23 inches. The great size, brown upper parts and white under parts are distinguishing features.

Range: Breeds from northwestern Alaska, and central Canada south to the Gulf coast, western Mexico and Lower California; winters from the southern United States, Lower California and Mexico to Central America.

A thin, high-pitched whistle, the alarm as well as the call note of the osprey, frequently directs the attention of the passer by to this fine hawk as he circles high in air on the watch for fish. The bird is common along our coast and to some extent along our rivers, and his bulky nest of twigs, often in low trees or sometimes on the ground, frequently attests his former presence when he is wintering elsewhere. When unmolested, ospreys return to their own strip of territory year after year, and they and their descendants probably rear their young in the same nest for generations, repairing it from season to season as necessity requires. The osprey lives solely on fish which he catches himself—he disdains carrion—diving from mid air upon his quarry and often burying himself in the water momentarily by the force of his descent. Usually he succeeds in carrying his prey to his nest, though his slow and labored wing-beats often prove how heavy is his load. Visitors to the seashore, and even old residents, never tire of watching his superb flight and interesting habits, and his plunge after his quarry, whether successful or unsuccessful, is a sight to be remembered.

BALD EAGLE (Haliætus leucocephalus and subspecies)

Length, about 33 inches. The white head (adult) and naked tarsus distinguish this species from the golden eagle.

Range: A resident of Alaska, much of Canada, and the whole of the United States in suitable localities.

Though a fisherman by profession, the white head is by no means the master of his craft that the osprey is. In fact, he never fishes for himself so long as he can rob the more skillful and more industrious fish hawk. When necessity compels, however, he fishes to some purpose, and much after the manner of his erstwhile victim, the fish hawk. He is far less fastidious in his food habits than that bird, however, and often gorges himself until he cannot fly on dead fish gathered along shore, especially on the great salmon rivers of the northwest. When fish are scarce and waterfowl are plentiful, the white head has little difficulty in living off them. Complaint is made in Alaska, where the bald eagle is numerous, that he sometimes interferes with blue fox farming by killing the animals for food. Though the blue fox is not a large animal he is by no means a pigmy, and the bird who would make him his quarry must needs possess both strength and determination. As this eagle has been taken for our national emblem, it would seem to be the part of patriotism to condone his faults and remember only his virtues, among which are a magnificent presence, superb powers of flight, and devoted care of his family.



OSPREY, OR FISH HAWK, RISING FROM A STRIKE

When a fish is sighted, this bird checks himself directly over the quarry on wings that beat horizontally, then down he goes at reckless speed, with wings folded and talons wide open. There is a great splash as the hawk strikes the water and seizes the fish by the back. In the picture above the osprey had been deceived by an artificial gold fish anchored by an 18-ounce stone, and it shows him shooting upward after the decoy had slipped from his grasp.



Marsh Hawk



Turkey Buzzard

MARSH HAWK (Circus hudsonius)

Length, about 19 inches. The ashy upper parts, white rump, and long tail of the adult male sufficiently distinguish this hawk; while the fuscous upper parts and buff under parts much streaked with brown distinguish the female and young.

Range: Breeds through much of Canada, south to the middle United States; winters in the United States, especially in the South.

Though not exclusively a marsh frequenter, as its name might seem to imply, this hawk prefers open country, and its favorite hunting grounds are meadow and marsh, in which it nests on the ground. It flies rather low, the better to see and drop suddenly upon the luckless meadow mice—its favorite food. Unfortunately small birds form part of its fare, and there are localities, like Cape Cod and Marthas Vineyard, in Massachusetts, where this hawk has earned a bad reputation as a destroyer of poultry and game. However, over much the larger part of the vast territory it inhabits the marsh hawk is a rodent eater, and the debt of gratitude it lays upon the farmer is large. This debt should be fully discharged by preserving the bird and encouraging its presence unless it is caught committing overt acts. In other words, as this hawk is very beneficial over most of its range, individual hawks should be presumed to be innocent unless detected in transgression.

TURKEY BUZZARD (Cathartes aura septentrionalis)

Length, about 30 inches. The naked head and neck and glossy black plumage are distinctive.

Range: Extends from southwestern Canada, northern Minnesota, southern New York, and south into northern Mexico and Lower California.

This buzzard displays superb powers of flight which even the eagle cannot surpass, and no small part of its time is spent in the upper air, describing great circles on motionless wings as if for the mere pleasure of flight. Let another buzzard, however, discover a carcass, and the movements of our aeronaut as he hastens to the feast are at once noted by his next neighbor, and his by a third, till the carrion feeders of a wide territory are assembled. Sight and not smell, then, is depended on by the buzzard to guide him to his food. Though of great strength and provided with a formidable bill the buzzard rarely, if ever, attacks living animals, unless they are disabled, but depends upon death to provide for his wants. No doubt his ability to fast is as great as his capacity for gorging himself when occasion offers, and he must often go for days without food. As a scavenger the buzzard does good service and should continue to enjoy the protection which is at present accorded it in nearly every State of the Union.



Photograph by Arthur E. Mayer

HUSBAND AND WIFE

The magnificent plumage of the peacock belongs only to the male, and it may be noticed that the female to the left of the picture is far less handsome than her husband, who presents us with a back view of his outstretched tail. These birds were once highly esteemed as food, and in the middle ages always figured at the great banquets; roasted, but in all the glory of their gaudy plumage.



KILLDEER
BLACK TERN



UPLAND PLOVER
FRANKLIN'S GULL





KILLDEER (Oxyechus vociferus)

Length, 10 inches. Distinguished by its piercing and oft-repeated cry—*kildee*.

Range: Breeds throughout the United States and most of Canada; winters from central United States to South America.

Habits and economic status: The killdeer is one of the best known of the shorebird family. It often visits the farmyard and commonly nests in pastures or cornfields. It is rather suspicious, however, and on being approached takes flight with loud cries. It is noisy and restless, but fortunately most of its activities result in benefit to man. The food is of the same general nature as that of the upland plover, but is more varied. The killdeer feeds upon beetles, grasshoppers, caterpillars, ants, bugs, caddis flies, dragonflies, centipedes, spiders, ticks, oyster worms, earthworms, snails, crabs, and other crustacea. Among the beetles consumed are such pests as the alfalfa weevil, cotton-boll weevil, clover-root weevil, clover-leaf weevil, pine weevil, billbugs, white grubs, wireworms, and leaf beetles. The bird also devours cotton worms, cotton cutworms, horseflies, mosquitoes, cattle ticks, and crawfish. One stomach contained hundreds of larvæ of the saltmarsh mosquito, one of the most troublesome species. The killdeer preys extensively upon insects that are annoying to man and injurious to his stock and crops, and this should be enough to remove it from the list of game birds and insure its protection.

BLACK TERN (Hydrochelidon nigra surinamensis)

Length, 10 inches. In autumn occurs as a migrant on the east coast of the United States, and then is in white and gray plumage. During the breeding season it is confined to the interior, is chiefly black, and is the only dark tern occurring inland.

Range: Breeds from California, Colorado, Missouri, and Ohio, north to central Canada; winters from Mexico to South America; migrant in the eastern United States.

Habits and economic status: This tern, unlike most of its relatives, passes much of its life on fresh-water lakes and marshes of the interior. Its nests are placed among the tules and weeds, on floating vegetation, or on muskrat houses. It lays from 2 to 4 eggs. Its food is more varied than that of any other tern. So far as known, it preys upon no food fishes, but feeds extensively upon such enemies of fish as dragonfly nymphs, fish-eating beetles, and crawfishes. Unlike most of its family, it devours a great variety of insects, many of which it catches as it flies. Dragonflies, May flies, grasshoppers, predaceous diving beetles, scarabæid beetles, leaf beetles, gnats, and other flies are the principal kinds preyed upon. Fishes of little economic value, chiefly minnows and mummichogs, were found to compose only a little more than 19 per cent of the contents of 145 stomachs. The great consumption of insects by the black tern places it among the beneficial species worthy of protection.

UPLAND PLOVER (Bartramia longicauda)

Length, 12 inches. The only plainly colored shorebird which occurs east of the plains and inhabits exclusively dry fields and hillsides.

Range: Breeds from Oregon, Utah, Oklahoma, Indiana, and Virginia, north to Alaska; winters in South America.

Habits and economic status: This, the most terrestrial of our waders, is shy and wary, but it has the one weakness of not fearing men on horseback or in a vehicle. One of these methods of approach, therefore, is nearly always used by the sportsman, and, since the bird is highly prized as a table delicacy, it has been hunted to the verge of extermination. As the upland plover is strictly beneficial, it should no longer be classed as a game bird and allowed to be shot. Ninety-seven per cent of the food of this species consists of animal forms, chiefly of injurious and neutral species. The vegetable food is mainly weed seeds. Almost half of the total subsistence is made up of grasshoppers, crickets, and weevils. Among the weevils eaten are the cotton-boll weevil, greater and lesser clover-leaf weevils, cowpea weevils, and billbugs. This bird devours also leaf beetles, wireworms, white grubs, army worms, cotton worms, cotton cutworms, sawfly larvæ, horseflies, and cattle ticks. In brief, it injures no crop, but consumes a host of the worst enemies of agriculture.

FRANKLIN'S GULL (Larus franklini)

Length, 15 inches. During its residence in the United States Franklin's gull is practically confined to the interior and is the only inland gull with black head and red bill.

Range: Breeds in the Dakotas, Iowa, Minnesota, and the neighboring parts of southern Canada; winters from the Gulf coast to South America.

Habits and economic status: Nearly all of our gulls are coast-loving species and spend comparatively little of their time in fresh water, but Franklin's is a true inland gull. Extensive marshes bordering shallow lakes are its chosen breeding grounds, and as many such areas are being reclaimed for agricultural purposes it behooves the tillers of the soil to protect this valuable species. When undisturbed this gull becomes quite fearless and follows the plowman to gather the grubs and worms from the newly turned furrows. It lives almost exclusively upon insects, of which it consumes great quantities. Its hearty appetite is manifest from the contents of a few stomachs: A, 327 nymphs of dragonflies; B, 340 grasshoppers, 52 bugs, 3 beetles, 2 wasps, and 1 spider; C, 82 beetles, 87 bugs, 084 ants, and 1 cricket, 1 grasshopper, and 2 spiders. About four-fifths of the total food is grasshoppers, a strong point in favor of this bird. Other injurious creatures eaten are billbugs, squash bugs, leaf-hoppers, click beetles (adults of wireworms), May beetles (adults of white grubs), and weevils. Franklin's gull is probably the most beneficial bird of its group.





Screech Owl
Barn Owl

SCREECH OWL (Otus asio)

Length, about 8 inches. Our smallest owl with ear tufts. There are two distinct phases of plumage—one grayish and the other bright rufous.

Range: Resident throughout the United States, southern Canada, and northern Mexico.

Habits and economic status: The little screech owl inhabits orchards, groves, and thickets, and hunts for its prey in such places as well as along hedge-rows and in the open. During warm spells in winter it forages quite extensively and stores up in some hollow tree considerable quantities of food for use during inclement weather. Such larders frequently contain enough mice or other prey to bridge over a period of a week or more. With the exception of the burrowing owl, it is probably the most insectivorous of the nocturnal birds of prey. It feeds also upon small mammals, birds, reptiles, batrachians, fish, spiders, crawfish, scorpions, and earthworms. Grasshoppers, crickets, ground-dwelling beetles, and caterpillars are its favorites among insects, as are field mice among mammals and sparrows among birds. Out of 324 stomachs examined, 160 were found to contain insects; 142, small mammals; 56, birds, and 15, crawfish. The screech owl should be encouraged to stay near barns and outhouses, as it will keep in check house mice and wood mice, which frequent such places.

BARN OWL (Aluco pratincola)

Length, about 17 inches. Facial disk not circular as in our other owls; plumage above, pale yellow; beneath, varying from silky white to pale bright tawny.

Range: Resident in Mexico, in the southern United States, and north to New York, Ohio, Nebraska, and California.

Habits and economic status: The barn owl, often called monkey-faced owl, is one of the most beneficial of the birds of prey, since it feeds almost exclusively on small mammals that injure farm produce, nursery, and orchard stock. It hunts principally in the open and consequently secures such mammals as pocket gophers, field mice, common rats, house mice, harvest mice, kangaroo rats, and cotton rats. It occasionally captures a few birds and insects. At least a half bushel of the remains of pocket gophers have been found in the nesting cavity of a pair of these birds. Remembering that a gopher has been known in a short time to girdle seven apricot trees worth $100, it is hard to overestimate the value of the service of a pair of barn owls; 1,247 pellets of the barn owl collected from the Smithsonian towers contained 3,100 skulls, of which 3,004, or 97 per cent, were of mammals; 92, or 3 per cent, of birds, and 4 were of frogs. The bulk consisted of 1,087 field mice, 650 house mice, and 210 common rats. This valuable owl should be rigidly protected everywhere.



Photograph by George Shiras 3d

A REMARKABLE FLASHLIGHT OF A SNOWY OWL

White Fish River, Michigan. The author was looking for deer. Flash held in one hand and camera in the other. The owl fell 15 feet into the water, swore like a trooper, and waded ashore.

FRIENDS OF OUR FORESTS—THE WARBLERS

By HENRY W. HENSHAW

With Illustrations from Paintings by Louis Agassiz Fuertes

AT EVERY stage of their growth, from the seed to the adult tree, our forest, shade, and orchard trees are subject to the attacks of hordes of insect enemies, which, if unchecked, would soon utterly destroy them.

What the loss of our forest and shade trees would mean to us can better be imagined than described. Wood enters into so many products that it is difficult to think of civilized man without it, while the fruits of our orchards also are of the greatest importance. Aside from the economic loss, which can hardly be imagined, much less estimated, how barren the world would seem shorn of our forests and beautiful shade trees!

Fortunately, the insect foes of trees are not without their own persistent enemies, and among them are many species of birds whose equipment and habits specially fit them to deal with insects and whose entire lives are spent in pursuit of them. Many insects at one or another stage of their existence burrow deeply into the bark or even into the living wood of trees, and so are quite safe from ordinary bird enemies. Woodpeckers, however, being among the most highly specialized of birds, are wonderfully equipped to dig into wood and to expose and destroy these hidden foes.

Certain insects that largely confine their attacks to the smaller branches and terminal twigs are sought out and preyed upon by nuthatches, creepers, titmice, and warblers. Others, and their number is legion, attack the blossoms and foliage, and here the nimble and sharp-eyed warblers render supreme service, the number of plant lice and lepidopterous larvæ they destroy in a single day almost challenging belief.

Thus our woodland songsters are among the most important of all our birds, and in their own field render man unequaled service. Moreover, very few have any injurious habits, and the little harm they do, if any, weighs as nothing in the balance when compared with the good. By reason of their numbers and their activity in hunting insects, our warblers take first place as preservers of the forest, and the following account, which treats of about half the total number, is devoted to the more conspicuous, the more important, and the commoner species.

THE WARBLER FAMILY

Our wood warblers are assembled in a rather loosely defined family (the Mniotiltidæ), embracing in all about 140 species, of which more than a third are visitors to the United States. They are fairly well distributed over the country at large, although more species make their summer homes in the eastern half of the United States than in the western.

A number of notable species, however, summer in the West, as they do also in the Southern States. Our New World warblers are quite unlike their Old World relatives, the Sylviidæ, or true warblers, whose family includes some 75 genera and between 500 and 600 species.

Not only do our American species differ structurally in many particulars from their Old World representatives, especially in possessing nine instead of ten primaries, but they differ markedly also in appearance and habits. It may be said in passing that while our warblers are brilliantly colored and many of them sexually dissimilar, those of the Old World are not only small, but plainly plumaged; moreover, the sexes are generally alike in coloration.

The larger number of our warblers, as well as the most characteristic, are included in the one genus Dendroica, which is notable, since it includes more species than any other genus of North American birds.

Fortunately for the bird lover, our wood warblers are not recluses. They are creatures of light and sunshine. Some of them, it is true, retire to the mountain fastnesses or the depths of coniferous forests during the nesting period; but

the number of these is small and their withdrawal for only a comparatively short time, while the majority at all times of the year favor the edges of the forest, open woods, or brushy clearings.

Their preference for such situations brings many within the bounds of civilization and renders it comparatively easy for any one so inclined to make their acquaintance. As during migration they assemble in flocks, they are, on the whole, pretty well known; and since, as a rule, they are not shy, they have long been favorite objects of observation and study.

WARBLERS AS SONGSTERS

Despite their name, which would seem to imply musical ability of no mean order, our wood warblers, with few exceptions, occupy no very high place in the musical galaxy. All sing, however, after a fashion, and the musical efforts of some are pleasing, even according to human standards. While most warblers are prodigal enough with their music and sing early and often, especially prior to and during the nesting season, their music is frequently so faint as to be audible only to the trained ear of the bird lover.

As if aware of their musical inferiority, few display much enthusiasm in their vocal efforts, but sing while they work, or while pausing for a brief moment as they move among the foliage hunting for food. With them, singing appears to be an audible expression of general content and well being, and, no doubt, an effort to please and attract their mates.

Certain members of the thrush and thrasher families, on the contrary, which contain in their ranks the prima donnas of our bird world, as if conscious of their supremacy, are wont to mount a commanding perch when about to sing, and to pour out their melody for all the world to hear. With them, singing is not merely incidental to the day's work. It is a conscious and supreme effort, and is much too important to be slighted or shared with any other function. Apparently they appreciate to a great extent and enjoy their own outpourings, and, if we may interpret their feelings by human standards, are conscious that their musical offerings entitle them to an audience.

Not only do their bright colors suggest a tropical origin of our warblers, but their whole make-up is in keeping with tropical surroundings. Warblers are thinly feathered and delicately organized and most of them incapable of withstanding any great degree of cold. They are also almost exclusively insect eaters, only a few of the family being at all vegetarian, and these only to a comparatively small extent.

Hence, with them, migration is not a matter of choice, but is imperative. They come to us on a particular errand for a few short months, and when family cares are at an end, back they hie to the tropics, the lands of warmth and sunshine, which lend them to us for a brief season. Thus the true home of our warblers is not where they nest, but where they spend three-fourths of their lives—not the north, but the south—not in the temperate, but in the tropical zones.

THE SPECTACULAR MIGRATION OF WARBLERS

That wonderful phenomenon, bird migration, is illustrated by few birds so clearly and convincingly as by our wood warblers. Assuredly no other birds—unless it be the geese—migrate in such a spectacular manner. The stroller, in late August or September, finds himself in the woods, the silence being broken only by the drumming of a distant partridge, the chirping of insects, or other familiar sounds which only emphasize the general quiet that prevails (see pages 180-195).

Presto! The scene changes! The woods, apparently almost tenantless but a moment before, are now filled with life of the most animated and intense kind. Every shrub, every tree, has its feathered occupant. Our observer recognizes perhaps a dozen or twenty species, representing several distinct families; but prominent among them, by reason of numbers, variegated plumage, graceful forms, and active motions, are the wood warblers.

Every individual is alert and busy, gliding from one twig to another near by, or flying from one tree to the next, while from all sides come the soft calls and notes of individual members of the flock, whose friendly converse has the effect, if

not the purpose, of keeping the individuals of the assemblage in touch with each other and with the flock as a unit. In a few moments silence again reigns where all was commotion and activity. The birds have passed on their seemingly aimless course.

If the observer would learn the solution of the mystery of the birds' evident hurry, he has only to follow them for a time, when he will find that, however erratic may seem the course of individual members of the flock, the flock as a whole is steering a tolerably straight course southward. In other words, he is in the midst of a flock of birds en route to their winter quarters and, in order to economize time, feeding as they go. This, however, is not the only way warblers migrate, nor is it the most important, since the greater part of the long journey of many is performed by night.

Any one with good ears has only to listen on a clear, frosty night in fall to hear hundreds of warblers and other birds as they flit by, a few hundred yards above the earth, the call notes coming incessantly out of the darkness. The route of these flying hosts often carries them above cities, and one cannot be insensible to the incongruity between his surroundings and the woodland scenes, so vividly brought to mind by the lisping notes coming from the darkness overhead. The subject of migration has not inspired our poets so often as might be expected, but Longfellow, in his "Birds of Passage," gives us the following wonderfully suggestive lines:

> But the night is fair,
> And everywhere
> A warm, soft vapor fills the air,
> And distant sounds seem near;
> And above, in the light
> Of the star-lit night,
> Swift birds of passage wing their flight,
> Through the dewy atmosphere.
>
> I hear the beat
> Of their pinions fleet,
> As from the land of snow and sleet
> They seek a southern lea.
> I hear the cry
> Of their voices high,
> Falling dreamily through the sky,
> But their forms I cannot see.

Probably because insects constitute such an important part of their food, warblers, as a rule, migrate early in fall and late in spring. It is true that in fall many linger till frosts nip the vegetation; but insects are abroad even later than this, and it is only necessary to watch these late migrants for a short time to learn that their search for insects is being well rewarded.

Only a few species come north early in spring, the great bulk of the warblers evidently having been taught by bitter experience that in spring, at least, it is not the early bird that finds most worms or finds them easiest.

FLOCKING OF SMALL BIRDS

Just why small birds, when migrating, congregate in large flocks and troop through the woodlands has often been the subject of speculation. Juncos, several species of sparrows, woodpeckers, nuthatches, chickadees, creepers, and, above all, warblers, combine to swell the ranks of these migrating companies. As many as a dozen or more species of warblers may often be seen in one flock, which, in addition, may include 200 or 300 individuals, representing a number of families whose tastes and habits in every-day life differ very widely.

Yet here are these incongruous elements mingling together on terms of the utmost friendliness. Since birds are sociable beings, except during the short time when family cares prompt to jealous vigilance, sociability alone may be the bond of union; added, however, to the kindly feeling of companionship probably is a feeling of increased security which comes from numbers. Certainly no enemy can approach one of these bird assemblages without being spied by at least one pair of vigilant eyes, when the flock is immediately notified by a few sharp chirps—warning for every individual to seek safety in flight or to scurry to cover.

WHAT MYSTERIOUS SENSE GUIDES THEM IN THEIR LONG JOURNEYS?

In what manner warblers migrate—that is, how they are guided on their long journeys—is a moot question. Little mystery attaches to their ability to find their way north or south in daylight, since the recognizable landmarks are

many and prominent. As most birds, especially the warblers, choose starlight and moonlight nights for their trips, perhaps they are similarly guided by night, and natural landmarks, as mountains, rivers, and the coastline may point out much, if not all, of their way.

However plausible this explanation may sound in the case of birds migrating over land, it utterly fails when applied to migrants whose journeys north and south necessitate flight over long stretches of ocean, in some instances at least 2,000 miles, quite out of sight of land and of all landmarks (see pages 180-195).

In seeking an explanation of the mystery of birds' ability to find their way under such circumstances, many are inclined to reject the one-time sufficient answer, "instinct," in favor of the more recent theory, the possession by birds of another faculty, the so-called "sense of direction." This added sense enables birds to return to a known locality with no other aid than an ever-present knowledge of the right direction.

But, in the case of our wood warblers, there is little need of appealing to another sense to guide them in migration, or, indeed, to anything out of the ordinary save excellent memory and good eyesight. The five-hundred-mile flight toward the tropics across the Gulf of Mexico is made by preference, and however it originated as a fly line, had it proved to be extra hazardous, it might have been abandoned at any time in favor of the apparently safer West Indian route.

But, after all, the Gulf trip involves few hazards other than those connected with storms, since the flight across the water, even at a slow rate, would necessitate a journey of less than 24 hours, and this, no doubt, is quite within the capacity of even the smallest and weakest of the family. Moreover, the South American Continent is too big a mark to be easily missed, and an error of a few hundred miles north or south would make little difference in the safety of the birds.

WHY WARBLERS MIGRATE

It may be set down as an axiom that all birds which travel south in fall do so because they must migrate or freeze or starve. Why some of them leave early, when food in their summer home is seemingly so abundant, is indeed a puzzle. Once the nestlings are on the wing and ready for the journey, off they go, old and young.

Nevertheless, by an apparently premature start they only anticipate by a few weeks the time of scarcity when they must go, and perhaps the lesson of bitter experience in the history of the several species has taught them to go when all the conditions are favorable. It is true that every winter a few birds, often a few individuals of a given species, winter far north of the customary winter home. Some of these are evidently stragglers or wanderers which, for some unexplained reason, failed to accompany the rest of their kind on the southward migration. They in no wise affect the general statement, being exceptional in every way.

A few of our warblers in Florida and on other parts of our southern coast do not migrate; but the almost universal rule in the family is to abandon the summer home when the care of the young ceases and to go far southward ere they stop for the winter. Indeed, the males of many species do not trouble themselves much with the care of the nestlings, but prepare to migrate before the young are well on the wing.

A still more flagrant case is that of the hummingbirds. The male deserts the female when she is still on her eggs, shifting the responsibility of caring for the family entirely on her devoted head, while he disports himself among the flowers, leaving for the south long before his exemplary mate and the young are ready.

Some of our species, however, while migrating southward, are satisfied to remain all winter within our boundaries. Thus the pine and palm warblers winter in the Gulf States, while a greater or less number of individuals, representing several species, winter in southern Florida. The great majority, however, winter south of the United States, in Central and South America.

Thus Professor Cooke tells us: "The prairie, black-throated blue, Swainson's, Bachman's, Cape May, and Kirtland's

warblers go only to the West Indies. The worm-eating, myrtle, magnolia, chestnut-sided, black-throated green, hooded, blue-winged, Nashville, orange-crowned, parula, palm, and Wilson's warblers, and the chat, go no farther than Central America, while many species spend the winter in South America, including some or all the individuals of the black and white, prothonotary, golden-winged, Tennessee, yellow, cerulean, bay-breasted, black-poll, Blackburnian, Kentucky, Connecticut, mourning, and Canada warblers, the redstart, oven-bird, and both the water-thrushes. Nearly all the warblers of the western United States spend the winter in Mexico and the contiguous portions of Central America."

VAST NUMBERS SUCCUMB

The northward journey in spring, away from the land of sunshine and plenty to the land of uncertain spring weather, is another matter. Probably if all birds that habitually abandon the north and winter in the south were to nest there, their quota, added to the number resident in the tropics, would be too great for the means of subsistence.

Nevertheless, birds are not forced away from their winter quarters by inclement weather or impending famine, but by the subtle physiological change which warns them of the approach of the mating season and fills them with new desires, among which is the compelling one of a return to the spot where they first saw the light, or where they reared last season's brood.

Whatever the cause, the birds are not discouraged by the many and great perils that attend migration, and vast numbers every year succumb to them. Storms, especially off-shore storms, constitute the gravest peril, and there is abundant evidence that millions of birds are annually blown out to sea to find watery graves. Perhaps no family suffers more in the aggregate than the warblers. Thinly feathered, delicately organized, highly insectivorous, they are exposed to unusual dangers while birds of passage to and from their nesting grounds.

It is a matter of common observation that every few years in some given locality, perhaps embracing a region of considerable size, a particular species of warbler or other bird suddenly becomes rare where before common. After a season or so, though sometimes not for years, the equilibrium is reëstablished and the numbers are as before. These changes very probably are the visible signs of migration catastrophes, the result of the sweeping away of a migration wave, composed of one or of many species, in the path of some sudden storm.

Again, many of us have witnessed the dire effects of a prolonged rain and sleet storm in spring, when thousands of luckless migrants find only too late that they have prematurely left the warmth and plenty of their tropical winter refuges. Under such circumstances thousands of migrants perish from the combined effects of cold and starvation, and among them are sure to be great numbers of warblers.

ECONOMIC VALUE OF WARBLERS

From the esthetic point of view, our warblers, as a group, occupy a high and unique position. They also occupy no uncertain place in the list of our useful birds. Preëminently insectivorous, they spend their lives in the active pursuit of insects. They begin with the eggs, preying upon them whenever and wherever found, and continue the good work when the egg becomes the larva and when the larva becomes the perfect insect.

They are especially valuable in this respect because of the protection they lend to forest trees, the trunk, bark, and foliage of which they search with tireless energy. Their efficiency is vastly increased because the many different species pursue the quest for food in very different ways. While some confine their search chiefly to the trunks and large branches and examine each crack and crevice in the bark for eggs or larvæ, others devote their energies to the twigs and foliage, scanning each leaf and stem with eager eyes. Still others descend to the ground and examine the rubbish and grass for hidden prey, while nearly all are adept at catching insects on the wing.

Each species, however, has a method of its own, more or less unlike that of its fellows, and each excels in some specialty. Not only does the group as a whole spe-

cialize on insects, but each individual member of the group still further specializes, so as to leave no loophole for the escape of the enemy.

The quantity of animal food required to drive the avian engine at full speed is so very great that it is no exaggeration to say that practically all the waking hours of our warblers, from daylight to dark, are devoted to food-getting. What this never-ceasing industry means when translated into tons-weight of insects, it is impossible even to guess, but the practical result of the work of our warblers and other insectivorous birds is that we still have our forests, and shall continue to have them so long as we encourage and protect the birds.

In the case of orchards and shade trees, there are other means at our disposal of controlling the insect enemy, notably the use of sprays. Sprays are very important, since birds are too few in number immediately to control insect outbreaks, especially nowadays, when the number of destructive native insects has been so greatly increased by importations from all quarters of the globe. But for the preservation of our forests we must rely largely upon our birds, since the use of sprays or of other agencies over our vast woodland tracts would be too expensive, even were it not quite impracticable for many other reasons.

MEANS OF INCREASING THE NUMBER OF WARBLERS

Insects are very numerous, and there is reason to believe that much benefit would result if we could multiply the present number of their enemies—the birds. The erection of bird boxes and shelters is an easy way to increase the number of certain species of birds, like swallows and chickadees. Unfortunately, with few exceptions, our warblers do not build their nests in cavities, and hence can not be induced to occupy bird boxes.

Many of them, however, nest in bushes, vines, and shrubbery, and by planting clumps of these near houses something can be done toward increasing the numbers of certain species, as the yellow warbler and the redstart. Because our warblers are chiefly insectivorous, their food habits bar them from the usual bird lunch-counter in times of hard storms.

During migration, warblers are peculiarly exposed to the danger of prowling cats. Many species feed close to or even on the ground, and then they are so much concerned with their own business that any tabby, however old and lazy, is equal to catching one or more individuals daily. The bird lover can do good service by summarily disposing of vagrant cats, which, during migration, work havoc in the ranks of our small birds.

They can also restrain the pernicious activities of their own pets, for these, however well fed, are still subject to the predatory instincts of their wild ancestry, which impel them to stalk a live bird with all the zeal and cunning of their forebears.

PLUMAGES OF WARBLERS

Little difficulty is experienced, even by the tyro, in distinguishing warblers from other birds, but to recognize the several species is not so easy, particularly as the adult males and females of many species are markedly dissimilar, while the young, both in the first and second plumages, often differ from the adults. So far as possible the various plumages are shown in the illustrations of Mr. Fuertes, which are so admirable as to do away with the need of descriptive text. All are approximately one-half life size.

MARYLAND YELLOW-THROAT (Geothlypis trichas and variety)

Length, about 5⅛ inches. Mostly green above, yellow below. Distinguished from other warblers by broad black band across forehead, bordered narrowly with white.

Range: Breeds from southern Canada to southern California, Texas, and Florida; winters from the southern United States to Costa Rica.

This little warbler is common throughout the Eastern and Southern States, frequenting thickets and low bushes on swampy ground. He is not a tree lover, but spends most of his time on or very near the ground, where he hunts assiduously for caterpillars, beetles, and various other small insects. Among the pests that he devours are the western cucumber beetle and the black olive scale. He has a cheery song of which he is not a bit ashamed, and when one happens to be near the particular thicket a pair of yellow-throats have chosen for their own, one has not long to wait for vocal proof that the male, at least, is at home. The yellow-throat has the bump of curiosity well developed, and if you desire a close acquaintance with a pair you have only to "squeak" a few times, when you will have the pleasure of seeing at least one of the couple venture out from the retreat far enough to make sure of the character of the visitor.

YELLOW-BREASTED CHAT (Icteria virens and subspecies)

Length, about 7½ inches. Its size, olive-green upper parts, and bright yellow throat, breast, and upper belly distinguish this bird at a glance.

Range: Breeds from British Columbia, Montana, Wisconsin, Ontario, and southern New England south to the Gulf States and Mexico; winters from Mexico to Costa Rica.

The chat is one of our largest and most notable warblers. It is a frequenter of brushy thickets and swampy new growth, and, while not averse to showing itself, relies more upon its voice to announce its presence than upon its green and yellow plumage. Not infrequently the chat sings during the night. The song, for song we must call it, is an odd jumble of chucks and whistles, which is likely to bring to mind the quip current in the West, "Don't shoot the musician; he is doing his best." In this same charitable spirit we must accept the song of the chat at the bird's own valuation, which, we may be sure, is not low. Its nest is a rather bulky structure of grasses, leaves, and strips of bark, and is often so conspicuously placed in a low bush as to cause one to wonder how it ever escapes the notice of marauders fond of birds' eggs and nestlings.

The chat does no harm to agricultural interests, but, on the contrary, like most of the warbler family, lives largely on insects, and among them are many weevils, including the alfalfa weevil and the boll weevil so destructive to cotton.

(See Biol. Surv. Bull. 17, p. 18 *et seq.;* also Circular 64, p. 5.)

OVEN-BIRD (Seiurus aurocapillus)

Length, a little over 6 inches. Above mostly olive green; below white, breast and sides streaked with black.

Range: Breeds from southern Mackenzie, Ontario, southern Labrador, and Newfoundland south to Wyoming, Kansas, southern Missouri, Ohio Valley, and Virginia; also in mountains of Georgia and South Carolina; winters in southern Florida, southern Louisiana, Bahamas, West Indies, and southern Mexico to Colombia.

The oven-bird is one of our best-known birds and one the woodland stroller is sure to get acquainted with, whether he will or no, so common is it and so generally distributed. In moments of ecstacy it has a flight song which has been highly extolled, but this is only for the initiated; its insistent repetition of "teacher, teacher, teacher," as Burroughs happily phrases it, is all the bird vouchsafes for the ears of ordinary mortals. Its curious domed-over grass nest is placed on the ground and is not hard to find. The food of the oven-bird does not differ greatly from that of other warblers, notwithstanding the fact that the bird is strictly terrestrial in habits. It consists almost exclusively of insects, including ants, beetles, moths, span worms, and other caterpillars, with a few spiders, millepods, and weevils.

(See Biol. Surv. Bull. 17; also yearbook for 1900, p. 416.)

RED-FACED WARBLER (Cardellina rubrifrons)

Range: Mainly in Transition Zone in mountains of southern Arizona and southwestern New Mexico and south through Mexico to the highlands of Guatemala.

So differently colored from our own North American warblers generally is the little red-face that one might at once suspect it to be a stranger from a strange land. So at least it seemed to me when, in the mountains near Apache, Arizona, in July, 1874, I saw the first one ever detected within our borders. Later in the same year I found others on Mount Graham. It is a Mexican species which has obtained a foothold along our southern borders in Arizona and New Mexico. As I noted at the time, I saw flocks of ten or fifteen among the pines and spruces, the birds frequenting these trees almost exclusively, only rarely being seen on the bushes that fringed the stream. In habits red-faced warblers are a rather strange compound, now resembling the common warblers, again recalling the redstart, but more often, perhaps, bringing to mind the less graceful motions of the familiar titmice. Their favorite hunting places appear to be the extremities of the limbs of spruces, over the branches of which they quickly pass, with a peculiar and constant sidewise jerk of the tail. Since 1874 other observers have had a better chance to study the bird and a number of nests have been taken. These were under tufts of grass, and in the case of one found by Price was "such a poor attempt at nest-building and made of such loose material that it crumbled to fragments on being removed."



MARYLAND YELLOW-THROAT
Female and Male



OVEN-BIRD



YELLOW-BREASTED CHAT



RED-FACED WARBLER

WORM-EATING WARBLER
(Helmitheros vermivorus)

Range: Breeds mainly in the Carolinian Zone from southern Iowa, northern Illinois, eastern and western Pennsylvania, and the Hudson and Connecticut River valleys south to southern Missouri, Tennessee, Virginia, and mountains of South Carolina; winters from Chiapas to Panama, in Cuba and the Bahamas.

He who would make the acquaintance of the worm-eating warbler must seek it in its own chosen home, far from which it never strays. It is a bird of shaded hillside and dark thickets along watercourses. Though nimble in its movements and an active insect hunter, it is an unobtrusive little warbler, garbed in very modest colors, and is likely wholly to escape the notice of the unobservant.

There seems to be an unusual degree of jealousy among the males, and a pair, the hunting and the hunted, are often seen pursuing a rapid, zigzag flight through trees and bushes. I imagine that in such cases the pursuing male, whose angry notes show how much in earnest he is, is asserting the right of domain over his own hunting grounds, and driving from his preserves an intruder.

Like several of our terrestrial warblers, the worm-eater has caught the trick of walking, perhaps borrowing it from his thrush neighbors, and he rarely or never hops. In his case the term "terrestrial" must be modified by the statement that to a certain extent he is a connecting link between the arboreal members of the family, as the black-throated green and Tennessee, which descend to the ground only casually, and such species as the Connecticut and the Swainson, which seek their food chiefly on the ground. Of the musical ability of the worm-eating warbler little is to be said save that his song is so very feeble that one must listen carefully to hear it at all, and that it much resembles that of our familiar "chippy" when heard a long distance off. This warbler nests on the ground, often on a hillside or in a shallow depression, and the pairs seem so much attached to their old home that they may confidently be looked for in the same place year after year.

GOLDEN-WINGED WARBLER
(Vermivora chrysoptera)

Range: Breeds in Alleghanian Zone from central Minnesota, southern Ontario, and Massachusetts south to southern Iowa, northern Illinois, northern Indiana, northern New Jersey, and northern Georgia; winters from Guatemala to Colombia.

Though less gaudily colored than certain others of our warblers, the golden-wing ranks high in the family for beauty, and its trim form and tastefully contrasted tints of gray, black, and yellow may well excite admiration. It is almost wholly limited to eastern States, rarely indeed being found west of the Mississippi, and its summer haunts are in the northern parts of its range. Though common in some localities, the golden-wing in most places is sufficiently rare always to interest the bird observer, and in Massachusetts if several are heard or seen in a long tramp the day may well be esteemed a red-letter day. The bird is to be looked for in deciduous timber, and is especially fond of elms and birches as hunting grounds. I have often seen it busy in elms so high up that only with difficulty could it be distinguished from the Tennessee, Nashville, and other strikingly different warblers in company with it. Like the blue-wing, it has the habit of clinging to the tip of a branch or cluster of flowers, back downward, examining the spot with the most exact scrutiny.

Once heard, its song is not to be forgotten nor mistaken for that of any other warbler, unless possibly the blue-wing. It possesses a buzzing, insectlike quality and is well represented to my ears by the syllables *ze-ze-ze-ze*, the latter notes in a higher pitch. It seems strange that a bird so distinctly arboreal in habits should choose to nest on the ground; but numerous nests of the golden-wing have been found, all of them practically on or a few inches from the earth, though usually supported by weed stalks or grass stems.

ORANGE-CROWNED WARBLER
(Vermivora celata celata)

Range: Breeds in lower Hudsonian and Canadian Zones from Kobuk River, Alaska, southeast to central Keewatin and Manitoba, and south locally in the Rocky Mountains to New Mexico; winters in the Gulf and South Atlantic States to South Carolina and south through Mexico to Mount Orizaba.

The orange-crowned warbler is much better known as a migrant, especially a fall migrant, than as a summer resident. Its summer home, in fact, is so far north that it is beyond the ken of most observers, although the bird occasionally summers, and no doubt nests, in Maine and Wisconsin. Seton found it a common summer resident in Manitoba; Kennicott discovered it nesting about the Great Slave Lake among clumps of low bushes; while Nelson found it common in summer in the wooded regions of northern Alaska. For some reason or other of late years the orange-crown seems to be a much commoner migrant in Massachusetts, and perhaps generally in New England, than formerly, and the sight of three or four in a day occasions no great surprise. It winters in Florida and in other of the South Atlantic States, and the cause of its rarity in the Eastern States in spring is due to the fact that it migrates up the Mississippi Valley. The orange-crown is one of the most plainly colored of the warbler tribe, and there is little about it to attract the notice of the casual observer. The song is said to consist of a few sweet trills, and, as is the case with the ditties of so many of its kind, has been likened to that of the familiar little "chippy."

BLUE-WINGED WARBLER (Vermivora pinus)

(For text, see page 87)

BLACK AND WHITE WARBLER (Mniotilta varia)

Length, about 4¼ inches. Easily known by its streaked black and white plumage.

Range: Eastern North America. Breeds from central Mackenzie, southern Keewatin, northern Ontario, Newfoundland, Nova Scotia, and New Brunswick to eastern Texas, Louisiana, central Alabama, and northern Georgia, west to South Dakota; winters in Florida and from Colima and Nuevo Leon to Colombia, Ecuador, and Venezuela.

A warbler in form and general make-up, a creeper by profession and practice, this readily identified species, in its striped suit of black and white, may be observed in any bit of eastern woodland. Here it flits from tree to tree or climbs over the trunks and branches, scanning every crack and cranny for the insects that constitute its chief food. Though not a lover of open country, it frequently visits the orchard, where it performs its part in the task of keeping insect life within due bounds. It nests on the ground and hides its domicile so skillfully that it is not often found. None of the warblers are noted as songsters, but the black and white creeper, as I like best to call it, emits a series of thin wiry notes which we may call a song by courtesy only. In scrambling over the trunks of trees it finds and devours many long-horned beetles, the parents of the destructive root-borers; it also finds weevils, ants, and spiders.

YELLOW WARBLER (Dendroica æstiva and races)

Length, little more than 5 inches. Mostly yellow, breast and belly streaked with reddish brown.

Range: North America, breeding generally throughout its range south to California, New Mexico, Missouri, and northern South Carolina; winters in Central and South America.

The "yellow bird," or wild canary, as it is sometimes called, is one of the commonest of the warbler tribe and ranges over a vast extent of territory, being found here and there from ocean to ocean. Unlike some of its relatives, it prefers open thickets, especially of willows, to thick woodland, and often builds its pretty nest by the roadside or in garden shrubbery. Though not an expert musician, the yellow warbler sings early and often, and in zeal makes up what it lacks in quality of voice. Because its nest is easily found by the initiated, this warbler is often victimized by the infamous cowbird, and is forced to bring up one, or even two, young cowbirds in place of its own rightful progeny. It is pleasant to be able to record the fact that sometimes the clever warbler knows enough—how it knows it is another matter—to evade the unwelcome responsibilities thus thrust upon it, and builds a platform over the alien egg, and then continues its domestic affairs as originally planned. Indeed, cases are on record when two cowbirds' eggs have been found in a nest, each covered up by a separate layer of nest material.

(See Biol. Surv. Bull. 17, p. 20 *et seq.*; also Bull. 20.)

AUDUBON'S WARBLER (Dendroica auduboni)

Length, about 5 inches. Much like the yellow-rump, but with yellow crown and throat patch.

Range: Breeds from central British Columbia, Alberta, and southwestern Saskatchewan to our southern border, east to South Dakota and Nebraska; winters from California and Texas south to Guatemala.

No member of the wood warbler family is more characteristic of the group than this beautiful bird. In voice, coloration, and habits it is almost the counterpart of the yellow-rump of the Eastern States, for which indeed it might easily be mistaken were it not for its yellow throat, the corresponding area in the yellow-rump being white. It summers in the mountains and shows off to advantage against the dark foliage of the pines. It seems to have little fear of man and in winter frequents orchards, gardens, and dooryards. Wherever it may be, it keeps up an incessant hunt for its insect food, in the pursuit of which, like many others of its family, it sometimes essays the rôle of flycatcher, being very expert and nimble on the wing. This warbler also devours large numbers of ants, flies, scale and plant lice, and noxious bugs.

(See Biol. Surv. Bull. 30, pp. 43-46.)

REDSTART (Setophaga ruticilla)

Length, nearly 5½ inches. To be distinguished from other warblers by its coloration and its motions. (See below.)

Range: Breeds from central British Columbia and eastern Canada to Washington, Utah Colorado, Oklahoma, and North Carolina; winters in the West Indies and from Mexico to Ecuador.

Its beauty of form and plumage and its graceful motions place this dainty bird at the head of our list of wood warblers—a place of distinction indeed. The bird appears to be the incarnation of animated motion and fairly dances its way through the forest. Spanish imagination has coined a suggestive and fitting name for the redstart, *candelita*, the little "torch-bearer." The full appropriateness of the name appears as the graceful creature flits through the greenery, displaying the salmon-colored body and the bright wing and tail patches. The redstart is not unknown in some parts of the West, but it is essentially a bird of the Eastern States, where it is a common inhabitant of open woodland districts. While it builds a rather neat and compact structure of strips of bark, plant fibers, and the like placing it in a sapling not far from the ground the nest is not the thing of beauty one might be led to expect from such a fairy-like creature. Ornamental as the redstart is, it possesses other claims on our gratitude, for it is a most active and untiring hunter of insects such as spittle insects, tree-hoppers, and leaf-hoppers, and both orchard and forest trees are benefited by the unceasing warfare it wages.

(See Biol. Surv. Bull. 17, p. 20 *et seq.*)







WORM-EATING WARBLER



ORANGE-CROWNED WARBLER

GOLDEN-WINGED WARBLER
Male and Female

BLUE-WINGED WARBLER



BLACK AND WHITE WARBLER



AUDUBON WARBLER



YELLOW WARBLER



REDSTART
Female and Male

TENNESSEE WARBLER (Vermivora peregrina)

Range: Breeds in Canadian Zone from upper Yukon Valley, southern Mackenzie, central Keewatin, southern Ungava, and Anticosti Island south to southern British Columbia, southern Alberta, Manitoba, northern Minnesota, Ontario, New York (Adirondacks), northern Maine, and New Hampshire; winters from Oaxaca to Colombia and Venezuela.

The Tennessee warbler is by no means as local as its name would imply, but is likely to be found in migration almost anywhere in eastern United States, although it is much more numerous in the Mississippi Valley. Unpretentious both in dress and character, this little bird seems to possess no very salient characteristics. It is, however, not likely to be mistaken for any other species save the Nashville, which it resembles rather closely. During spring migration the Tennessee is apt to be overlooked, since it is prone to keep in the tree-tops. In fall, however, it is found lower down, usually in company with flocks of other warblers, among which it becomes conspicuous by reason of its very inconspicuousness and in contrast with its more gaudy fellows.

Its song has been variously described and may be said to be a simple trill not unlike the chippy. It appears to be certain that the Tennessee, like the Nashville, nests on the ground, but apparently the nesting habits of the bird are comparatively unknown, or at least have not as yet been very fully recorded.

NORTHERN PARULA WARBLER (Compsothlypis americana usneæ)

Range: Breeds mainly in Transition and Austral Zones, from eastern Nebraska, northern Minnesota, central Ontario, and Anticosti and Cape Breton Islands south to central southern Texas, southern Louisiana, Alabama, Virginia, and Maryland; winters probably in the Bahamas and West Indies to Barbados, and from Vera Cruz and Oaxaca to Nicaragua.

The northern parula, smallest of our warblers, with prevailing colors blue and yellow, is generally distributed during migration and usually found in company with other warblers in leafy trees, which it explores from the lower to the topmost branches. It is one of the most active of the tribe, and is untiring in its pursuit of the minute insects which form its food. Its habit of hanging head downward as it explores a cluster of blossoms suggests a chickadee, and the little fellow is a combination of warbler, kinglet, and chickadee. It is very partial to nesting in usnea moss and so is found in summer along streams or in swampy localities where long streamers of the usnea festoon the trees. The preference of the parula for this moss as a site for its nest is exemplified by a nest I once found in Maryland on the bank of the Potomac, which had been built in the frayed end of an old rope hanging to a sapling and which a short distance away looked to me—and no doubt to the bird—exactly like a clump of usnea. As no usnea occurred in this locality, the bird accepted the frayed rope as a satisfactory substitute, and in so doing followed the spirit if not the letter of family tradition. However, the parula is not strictly limited to usnea for a nesting site and I once saw a pair carrying shreds of bark into a juniper on an island in the Potomac River, the nest being already far advanced toward completion. The parula has a short, buzzing song of which it is prodigal enough, but it is weak and can be heard at no great distance.

CAPE MAY WARBLER (Dendroica tigrina)

Range: Breeds in Canadian Zone from southern Mackenzie, northern Ontario, New Brunswick, and Nova Scotia south to Manitoba, northern Maine, and New Hampshire, and in Jamaica; winters in the Bahamas and the West Indies to Tobago.

Not only is the Cape May one of our most beautiful warblers, but its rarity adds greatly to the zest with which one hails the discovery of even an individual. This species, however, is far more numerous even in New England, especially in fall, than it used to be, and in time the bird may even be listed in many of the Eastern States as among the more common migrants.

Although the bulk of the species undoubtedly migrates north through the Mississippi Valley, rarely a spring passes that a few individuals are not reported about Washington, D. C., and I have seen several in a day. At this time of year the Cape May often forsakes the woodlands and appears in orchards or even in city parks, and probably not a season passes that one or more do not visit the Smithsonian or Agricultural Department grounds. Chapman tells us that in Florida he has seen the species "actually common feeding in weedy patches among a rank growth of pokeberries."

The bird is a rather sluggish, but persistent, insect hunter, though it adds to its bill of fare one item, grapes, which is bringing it into ill repute in parts of Pennsylvania and Virginia. The sharp-pointed bill of the Cape May enables it readily to puncture the skin, its apparent purpose being to satisfy its thirst with the sweet juice.

The Cape May is a persistent songster, but its song is weak and squeaky and by no means worthy of so superb a creature. Comparatively little is recorded of this bird's nesting habits. It is known to summer from northern Maine northward. A nest found by Banks at St. Johns, New Brunswick, was built in a cedar less than three feet from the ground.

BLUE-WINGED WARBLER (Vermivora pinus)

(For illustration, see page 84)

Range: Breeds from southeastern Minnesota, southern Michigan, western New York, Massachusetts (rarely), and southern Connecticut south to northeastern Kansas, central Missouri, Kentucky, Maryland, and Delaware; winters from southern Mexico (Puebla) to Guatemala.

Like the golden-wing, the blue-winged warbler is confined to the Eastern States, but it ranges considerably farther west than that species and occurs almost or quite to the Plains. The blue-wing is in many ways an inconspicuous member of the warbler group, but, because of its perplexing relationship with the golden-wing, Brewster's warbler, and Lawrence's warbler, its ornithological interest is excelled by few. Like the golden-wing, it prefers deciduous trees and second growths and shuns the deeper parts of the forests. It has the habit—shared by the golden-wing and chickadee—of hanging from the under side of any particular cluster it wishes to investigate, and no doubt it makes sure of insects that defy the less careful search of most other species. The ordinary song of the blue-wing is comparable to the golden-wing's, being in fact little else than an apology for a song, with the same insectlike quality. This warbler, though of distinctly arboreal habits, prefers to nest on the ground, or a few inches above it, in a tuft of grass, a clump of goldenrods, or at the foot of a sapling.

The nest is rather bulky, composed of leaves and grasses, put together after the artless manner of its kind; but it is usually well concealed by the surrounding screen of grass or weeds from any but chance discovery.

BLACK-THROATED BLUE WARBLER (Dendroica cærulescens cærulescens)

Range: Breeds in Canadian and Transition Zones from northern Minnesota, central Ontario, and northeastern Quebec south to central Minnesota, southern Michigan, southern Ontario, Pennsylvania (mountains), and northern Connecticut; winters from Key West, Florida, to the Bahamas, Greater Antilles, and Cozumel Island.

The male black-throated blue warbler is one of the most conspicuous of the warblers, his black throat and blue back serving to distinguish him at all times and all seasons. The female, despite her inconspicuous coloration, may always be identified by the white spot on the primaries. The bird is common and ranges widely through eastern North America, and few flocks of migrating warblers are without a greater or less number of this species. Though in the main a common resident of the northern woods, in the mountains it breeds as far south as Maryland, while a color variety of the bird (*Dendroica cærulescens cairnsi*) nests in the southern Alleghenies from Pennsylvania south to Georgia.

Thayer, as quoted by Chapman, says of the song: "There is not a more regularly and amply versatile singer among our eastern warblers than the black-throated blue. It has at least four main songs, on which it is forever playing notable variations."

Whether in its northern or southern home, the black-throated blue warbler builds its nest of bark, roots, and other pliant material, loose and rather bulky, in a variety of saplings, bushes, and weeds, but always a few inches or a few feet from the ground.

NASHVILLE WARBLER (Vermivora rubricapilla rubricapilla)

Range: Breeds in Canadian and Transition Zones from southern Saskatchewan, northern Ontario, central Quebec, and Cape Breton Island south to Nebraska, northern Illinois, northern Pennsylvania, northern New Jersey, and Connecticut; winters from Vera Cruz and Chiapas to Guatemala.

As Wilson never saw but three individuals of the Nashville warbler, all taken near Nashville, Tennessee, he not unnaturally named his new discovery for that city, apparently believing it to be a local species. Far from being so, however, it is now known to inhabit most of the eastern United States. Without doubt the bird is much more common than it was in Wilson's time, perhaps due to the fact that second growth and areas of low woods, its preferred haunts, have largely replaced the denser forests of the early part of the nineteenth century. One cannot wander far afield in Massachusetts in summer time without hearing its song or songs, since it is not only a frequent and vivacious songster, but has a number of ditties in its repertoire, including a flight song.

I never found but one nest, and this was on a little pine-wooded knoll in a small depression in the earth, only partially concealed by thin grass. I should never have found it but for the fact that the bird flushed from between my feet. So far as known, the Nashville always nests on the ground. Its preference for the ground as a nesting site is the more remarkable, since the bird rarely or never hunts there, but prefers to seek its insect food among the foliage, often of the tallest elms and chestnuts and other giants of the forest.

The Calaveras warbler (*Vermivora rubricapilla gutturalis*) is a form closely allied to the Nashville, but confined chiefly to the Pacific coast, extending eastward to eastern Oregon and northern Idaho. Fisher is quoted by Chapman as saying: "The Calaveras warbler is a characteristic denizen of the chaparral and is found on both slopes of the Sierra Nevadas about as far south as Mount Whitney. It frequents the belts of the yellow, sugar, and Jeffry pines, and ranges up into the red-fir zone. During the height of the nesting season, while the female is assiduously hunting among the dense cover of bushes, the male is often singing in a pine or fir, far above mundane household cares."









NASHVILLE WARBLER
TENNESSEE WARBLER

CAPE MAY WARBLER
Male and Female

PARULA WARBLER
Male and Female

BLACK-THROATED BLUE WARBLER
Female and Male



MAGNOLIA WARBLER
Adult and Immature Male



BLACK-POLL WARBLER
Male and Female



CHESTNUT-SIDED WARBLER
Male, Immature Male and Female



BLACKBURNIAN WARBLER
Male and Female

CHESTNUT-SIDED WARBLER (Dendroica pensylvanica)

Range: Breeds mainly in the Transition Zone from central Saskatchewan, northwestern Manitoba, central Ontario, and Newfoundland south to eastern Nebraska, Illinois, Indiana, northern Ohio, northern New Jersey, and Rhode Island, and south in the Alleghenies to Tennessee and South Carolina; winters from Guatemala to Panama.

Since the days of Wilson, Audubon, and Nuttall there is little doubt that the chestnut-sided warbler has increased in numbers, and within its range it is now one of the commoner of the family. It is trim of form and its colors, though not gaudy, have a quiet elegance all their own. During the fall migration it shows little preference in its hunting grounds, but is found with others of its kin in all sorts of woodland haunts and in deciduous as well as coniferous trees. It frequents open woodland tracts in summer and loves to nest in low thickets of hazel and barberry In favorable localities in Massachusetts I have frequently found half a dozen nests in a morning's search. The nests are made of shreds of bark and grasses and are put together so loosely and carelessly that, in connection with their situation, they unmistakably betray their ownership.

KENTUCKY WARBLER (Oporornis formosus)

(For illustration, see page 93)

Range: Breeds in Carolinian and Austroriparian Zones from southeastern Nebraska, southern Wisconsin, southeastern and southwestern Pennsylvania, and the Hudson Valley south to eastern Texas, Louisiana, Alabama, and northern Georgia; winters from Tabasco, Campeche, and Chiapas through Central America to Colombia.

The Kentucky warbler, with its rich colors and symmetrical form, is to be classed among the elect of the warbler tribe. Moreover, while locally common it is never so abundant that it does not excite a thrill of interest in the breast of even the most blasé of bird observers. It loves the deep, dark forest and shaded ravine, where the foliage overhead casts heavy shadows on the plentiful undergrowth beneath and where even in midsummer it is moist and cool.

The bird is a persistent singer, and in its own chosen haunts its loud, sweet song may be heard all day long. There is a curious resemblance between its ditty and that of the Carolina wren, and while no one can mistake the two songs when heard close by, at a distance even the expert may be puzzled. This warbler finds most of its food on the ground, and the thick undergrowth in which it hunts makes it difficult to learn much of its habits by observation, since it is difficult to keep an individual in sight many minutes at a time.

It builds a rather loose, bulky nest, largely of leaves and grasses, which is placed either on or just above the ground, and although it may seem to have been rather artlessly located it is in reality well protected by the surrounding vegetation with which it blends, and hence generally escapes the observation of all but the most persistent and sharp-sighted of observers.

WILSON WARBLER (Wilsonia pusilla pusilla)

(For illustration, see page 96)

Range: Breeds in Boreal Zones from tree limit in northwestern and central Mackenzie, central Keewatin, central Ungava, and Newfoundland south to southern Saskatchewan, northern Minnesota, central Ontario, New Hampshire, Maine, and Nova Scotia; winters in eastern Central America from Guatemala to Costa Rica.

This tiny warbler ventures farther north than many bigger and apparently hardier species, and Nelson found it in Alaska "one of the commonest of the bush-frequenting species, . . . extending its breeding range to the shores of the Arctic Ocean wherever it finds shelter." Cooke also found it in Colorado breeding from 6,000 to 12,000 feet elevation.

The black-cap is a nervous, energetic, little fellow, now essaying the rôle of flycatcher, now hunting for insects among the foliage, while ever and anon it jerks its tail up and down as though constant motion were the chief end of existence. It has a short, bubbling, warbling song which has been likened to the songs of several other species, but which possesses a tone and quality all the bird's own. Its nest is built on the ground, is composed chiefly of grasses, and the eggs do not differ in essential respects from those of other warblers.

It is noteworthy that the West Coast form of the black-cap chryseola breeds as far south as Los Angeles, and that its nest instead of being built on the ground is placed in the crotch of a limb or in a bunch of weeds or nettles.

CANADA WARBLER (Wilsonia canadensis)

(For illustration, see page 96)

Range: Breeds in the Canadian Zone and casually in the Transition from central Alberta, southern Keewatin, northern Ontario, northern Quebec, and Newfoundland south to central Minnesota, central Michigan, southern Ontario, central New York, and Massachusetts, and along the Alleghenies to North Carolina and Tennessee; winters in Ecuador and Peru.

The Canada warbler is always associated in my mind with the black-cap, in company with which it is frequently found during migration. The association is purely accidental and results from a common preference for the same hunting grounds. A path or road through swampy ground, especially if bordered by old willow trees, is sure to have its quota of this warbler and the Wilson black-cap during migration.

Like the black-cap, the Canada warbler is half flycatcher, half warbler, and the click of the bird's mandibles as they close on some hapless insect caught in mid-air is often the first indication of its presence. Unlike many of the family, it sings much during its spring migration. The song is loud for the size of the warbler and is very characteristic. The bird builds a rather bulky nest of leaves and grasses, which it places in a mossy bank or under a moss-grown log. It is an assiduous and active insect hunter and gleans among the leaves and twigs after the fashion of the parula warbler.

MAGNOLIA WARBLER (Dendroica magnolia)

Range: Breeds in Canadian and upper Transition Zones from southwestern Mackenzie, southern Keewatin, northern Quebec, and Newfoundland south to central Alberta, southern Saskatchewan, Minnesota, northern Michigan, and northern Massachusetts, and in the mountains of West Virginia, Maryland, Pennsylvania, and New York; winters from southern Mexico (Puebla and Chiapas) to Panama.

The magnolia, or black and yellow warbler, as I like best to call it, is one of our most beautiful warblers, and fortunately, being one of the commonest of the tribe, is easily met with by any one willing to take a little pains. When busy at its self-imposed task of hunting insects—and when is it not busy—it is by no means shy, and may be watched at close range with or without the aid of a field glass. Whenever or however met, the sight of a full-plumaged male resplendent in the gold and black livery of spring is worth a long journey.

The bird ranges over much of eastern North America as far west as the Plains, and toward the north reaches the Mackenzie region. In the mountains it breeds here and there as far south as Maryland. In migration the magnolia shows no preference for special localities, but occurs in upland woods and lowland shrubbery where is promised a good harvest of insects. Like so many of its fellows, it finds rich hunting grounds in gray birches, and few large companies of warblers traverse gray birch woods without their complement of these beautiful and sprightly wood nymphs. The magnolia warbler is a versatile, though scarcely an accomplished, songster, and phrases its song in a number of different ways. Many of its nests have been found in the northern woods, some of them in small firs or spruces only a few feet from the ground.

BLACK-POLL WARBLER (Dendroica striata)

Range: Breeds in Hudsonian and Canadian Zones from limit of trees in northwestern Alaska, northern Mackenzie, central Keewatin, northern Ungava, and Newfoundland south to central British Columbia, Manitoba, Michigan, northern Maine, and mountains of Vermont and New Hampshire; winters from Guiana and Venezuela to Brazil.

The black-poll is one of our commonest warblers, in both spring and fall, and probably heads the warbler list in point of numbers. So far as superficial observations go, the bird would seem to be no spryer, no more industrious, and no more adept in hunting food than its compeers; but for some reason or other, possibly greater adaptability, it seems to have succeeded beyond most of its kind in extending its breeding range and in multiplying. It is a late migrant, both spring and fall, and when the hordes of black-polls put in an appearance, especially in the vernal season, one may know that the end of the migrating season is at hand. A laggard in spring, it is also a loiterer in fall, and occasionally a flock of black-polls will linger in some sheltered valley where food is abundant till long after others of the family have passed southward.

The bird nests chiefly in the far north, though it summers as far south as the Adirondacks. As it winters in South America, there are thus at least 5,000 miles between its extreme northern and southern habitats. Chapman notes that it is one of the very few warblers that migrate directly across the West Indies from South America to Florida. It makes its appearance in the Gulf States about the last of April. As pointed out by Professor Cooke, the black-poll is "one of the greatest travelers among the warblers. The shortest journey that any black-poll performs is 3,500 miles, while those that nest in Alaska have 7,000 miles to travel to their probable winter home in Brazil." One can only wonder that so small a bird has the requisite courage and strength to undertake twice a year such a vast journey, every stage of which is compassed by dangers of one sort or another.

BLACKBURNIAN WARBLER (Dendroica fusca)

Range: Breeds in lower Canadian and upper Transition Zones from Manitoba, southern Keewatin, central Ontario, Quebec, and Cape Breton Island to central Minnesota, Wisconsin, northern Michigan, Massachusetts, and Connecticut, and in the Alleghenies from Pennsylvania to Georgia and South Carolina; winters from Colombia to central Peru and less commonly north to Yucatan.

The Blackburnian, one of the gems of the warbler tribe, has a rather wide range in eastern North America, extending west as far as the Plains and north to Manitoba. Apparently it is nowhere, at least in migration, an abundant warbler, and there are few field observers so seasoned to the sight of its beautiful colors as not to be thrilled by sight of the bird. In migration its habits offer nothing peculiar. In the Atlantic States in September careful scrutiny of a migrating band of warblers and other birds will often reveal the presence of one or perhaps half a dozen Blackburnians. About Mount Monadnock, Gerald Thayer finds it a "very common summer resident. It is one of the four deep-wood warblers of this region, the other three being the black-throated blue, the Northern parula, and the Canada."

The Blackburnian favors very big trees, particularly hemlocks, and spends most of its life high above the ground. As Thayer says, the Blackburnian is the "preeminent forest warbler of the group, the lover of deep mixed growth and the upper branches of the biggest conifers." The bird has a thin, shrill voice and utters at least two songs or variations which some think resemble the black-throated green's. Whatever the tree selected, be it a hemlock or a deciduous tree, the nest is placed well up among the branches and well out toward the end, where it is safe from all enemies that do not possess wings.



BAY-BREASTED WARBLER
Male and Female



BLACK-THROATED GREEN WARBLER
Male and Female



BLACK-THROATED GRAY WARBLER



PINE WARBLER



PALM WARBLER
YELLOW PALM WARBLER

PRAIRIE WARBLER
Male and Female



NORTHERN WATER-THRUSH
LOUISIANA WATER-THRUSH

KENTUCKY WARBLER
Male and Female

BAY-BREASTED WARBLER (Dendroica castanea)

Range: Breeds in Canadian Zone from northeastern Alberta, southern Keewatin, southern Ungava, and Newfoundland south to southern Manitoba, northern Maine, and mountains of New Hampshire; winters in Panama and Colombia.

The bay-breast appears to be increasing in numbers. Forty years or so ago it was rare in Massachusetts in fall, and search by the most vigilant collector during the entire autumn migration was rarely rewarded by the sight of more than one or two. Today it is far different, and not a season passes that at the proper time and place careful search will not reveal a dozen or more mingled with others of the warbler family. In spring the bird has always been uncommon or altogether wanting in the Eastern States, as it migrates up the Mississippi Valley, spreading out to occupy northern Maine and other of its northern summer haunts. In summer it frequents coniferous forests, and often nests in hemlocks.

BLACK-THROATED GRAY WARBLER (Dendroica nigrescens)

Range: Breeds in Transition Zone from southern British Columbia, Nevada, northern Utah, and northwestern Colorado south to northern Lower California, southern Arizona, and northern New Mexico; winters in southern Lower California and in Mexico from Durango to Michoacan, Vera Cruz, and Oaxaca.

The handsome black-throated gray warbler is exclusively western in distribution, from our southern border to British Columbia. Though I have seen it many times, I am unable to recall any especially salient characteristics possessed by the species. Like others of the family, the black-throat is an active insect hunter, both among the oaks and various kinds of scrub growths of the valleys and the conifers of higher altitudes. The bird seems naturally to suggest the black-throated green warbler of the Eastern States, but I am not aware that in habits it is more nearly comparable to that species than to others. In choice of nesting sites it exhibits a wide range of taste, and nests have been found in scrub oaks, pines, and firs, and varying in height from the ground from 3 or 4 feet up to 50 feet or more.

BLACK-THROATED GREEN WARBLER (Dendroica virens)

Range: Breeds in lower Canadian and Transition Zones from west, central, and northeastern Alberta, southern Manitoba, central Ontario, northeastern Quebec, and Newfoundland south to southern Minnesota, southern Wisconsin, northern Ohio, northern New Jersey, Connecticut, and Long Island, New York, and in the Alleghenies south to South Carolina and Georgia; winters in Mexico (Nuevo Leon to Chiapas and Yucatan), Guatemala, Costa Rica, and Panama.

What true bird lover is there who does not cherish fond memories of certain birds? The very name of black-throated green warbler carries me back to boyhood days and to a certain pine-crested hill in Massachusetts, from which was wafted on an early spring morning the song of this warbler, heard by me then for the first time. The many years since elapsed have not effaced the sweet strains, and I seem to hear them now as they were borne that morning by the pine-scented spring breeze. I can vividly recall the pleasure the song occasioned and the satisfaction of having added one more bird to my small list of avian acquaintances. Those were the days of mystery, when the woods seemed filled with unknown birds, and secrets lurked in every thicket and met the seeker at every turn. They were the times when bird books were few, keys unknown, and the keen eyes of youth far more satisfactory than the best field glasses of the present day.

The black-throated green is one of the commoner of our eastern warblers and one of the first to engage the attention of the bird student. During migration it may be met with in every kind of woodland, where it is at home, both high and low, ever pursuing with tireless energy its quest for insects. It has two songs, or rather one song delivered in two different ways, sprightly, sweet, and perfectly characteristic. In summer it is partial to coniferous woods, especially white pines and hemlocks, and it frequently nests in these, though also in birches and alders.

PINE WARBLER (Dendroica vigorsi)

Range: Breeds in Transition and Austral Zones from northern Manitoba, northern Michigan, southern Ontario, southern Quebec, and New Brunswick south to east-central Texas, the Gulf States, and Florida; winters from southern Illinois and coast of Virginia to Florida, eastern Texas, and Tamaulipas.

Few of our birds are so aptly named as the pine warbler, which first, last, and all the time, except in migration, resorts to pine woods. It summers in them in the north and it winters in them in the south. Even its feathers often bear conclusive evidence of its predilection for pines, being often besmeared with their gum. Among its bright-hued relatives the pine warbler cuts but a poor show with its somber green and brown coat, which, at least in Florida, is often dingy and smoke-begrimed from contact with burnt timber.

Though distinctively a warbler and not a creeper, the pine warbler is more deliberate in its motions than most of its kind and, somewhat in the manner of the creeper, moves among the branches or over the trunks in search of its insect food. For a warbler it is an early migrant and reaches the latitude of Massachusetts soon after the middle of April. Indeed, its nest contains eggs or young while the late migrants are still passing north. Its song has little variation, but while monotonous is pleasing and sweet, far sweeter than the trill of the chipping sparrow, which it recalls. Naturally the pine warbler nests in pines, usually rather high up, either on a horizontal limb or among the twigs at the extremity of a limb.

PALM WARBLER (Dendroica palmarum palmarum)

Range: Breeds in Canadian Zone from southern Mackenzie (Fort Simpson) and central Keewatin south and southeast to northern Minnesota; winters from southern Florida and the Bahamas to the Greater Antilles and Yucatan.

The palm warbler, including under this name both the eastern and western, or yellow (*Dendroica palmarum hypochrysea*), representatives of the species, is for the most part an inhabitant of the Mississippi Valley and the region eastward, spending its nesting season chiefly north of our northern frontier. It is, therefore, as a spring and fall migrant that it is best known. Its somewhat subdued tints of olive and yellow streaked with brown class it among the less conspicuous members of the warbler group, but its motions and habits unmistakably distinguish it from its fellows. Though often associating with other warblers as they flit from tree to tree, the palm warbler keeps close to Mother Earth and not infrequently visits pastures and stubble far from cover of any sort. Favorite hunting grounds are old fences and even buildings.

Perhaps the most salient characteristic of this little warbler is the almost incessant tip-up motion of its tail, in which respect it recalls a bird in no wise related to it—the spotted sandpiper, or "tip-up," of pond and stream. It nests on the ground. Its song is a low, faint trill, characteristically warblerlike, but in no way remarkable. It winters in great numbers in Florida, and in 1871 I found it wintering in loose flocks of considerable size near Lakes Borgne and Ponchartrain, Louisiana, where it fed chiefly on the ground and among low bushes.

PRAIRIE WARBLER (Dendroica discolor)

Range: Breeds chiefly in Carolinian and Austroriparian Zones from southeastern Nebraska, eastern Kansas, southern Ohio, southwestern Pennsylvania, southern New Jersey, and (along the coast) from Massachusetts south to southwestern Missouri, northern Mississippi, northwestern Georgia, Florida, and the Bahamas, and north locally to central Michigan, southern Ontario, and New Hampshire; winters from central Florida through the Bahamas and the West Indies.

The prairie, a dainty little warbler in its variegated black, yellow, and chestnut dress, is common from Florida to the New England States and from Nebraska and Kansas east to the Atlantic. Its choice of habitat varies considerably locally; but wherever it may be found there is nothing in the habits of the bird that justifies its common name, which is entirely misleading, since it has no predilection for prairies or indeed for open country of any sort. In Massachusetts it frequents rocky barberry pastures on open hillsides dotted with cedars. About Washington it frequents sprout lands, and when it first arrives from the south is found almost exclusively in groves of the Jersey scrub pine or in junipers. It is an active insect hunter, moving rapidly among the foliage, now here, now there, ever and again sending forth its characteristic song. Its unusually compact and pretty nest is often placed in the crotch of a barberry bush in Massachusetts or elsewhere in junipers or in low deciduous bushes.

NORTHERN WATER-THRUSH (Seiurus noveboracencis noveboracensis)

Range: Breeds chiefly in Canadian Zone from northern Ontario, northern Ungava, and Newfoundland south to central Ontario, northwestern New York, and northern New England, and in mountains south to Pennsylvania and West Virginia; winters from the Valley of Mexico to Colombia and British Guiana, and from the Bahamas throughout the West Indies.

So far as appearance, motions, and habits go, the water-thrush is more thrush than warbler, and one who sees him for the first time walking sedately along with teetering tail may well be excused for declining to class him with the warbler family. He is partial to swamps and wet places, is a ground frequenter, and in no real sense arboreal. Though an inhabitant of the wilds and showing strong preference for swampy ground, he not infrequently visits gardens even in populous towns, and seems to be quite at home there in the shade of the shrubbery. A sharp and characteristic alarm note often calls the attention of the chance passerby, who would otherwise overlook the bird in its shady recesses.

Few who are privileged to hear its notes will dissent from the opinion that the water-thrush is one of the foremost of the warbler choir and a real musician. The bird is a ground builder, placing its nest under the roots of an upturned tree, in banks, or in cavities of various sorts.

LOUISIANA WATER-THRUSH (Seiurus motacilla)

Range: Breeds mainly in Carolinian Zone from southeastern Nebraska, southeastern Minnesota, and the southern parts of Michigan, Ontario, New York, and New England south to northeastern Texas, northern Georgia, and central South Carolina; winters from northern Mexico to Colombia, the Greater Antilles, Antigua, and the Bahamas.

The Louisiana water-thrush, though not unlike its northern relative in general appearance, is very different in disposition and habits, and I know of no bird more shy and difficult to watch. It frequents the banks and neighborhood of clear streams that run through woodlands and tangles of laurel. One hears the sharp note of challenge or the wild ringing song, but any attempt to see the singer, unless made with the utmost caution, will end in disappointment or in a casual glimpse of a small brown bird flitting like a shadow through the brush.

The song of either water-thrush is of a high order of excellence. I cannot but think, however, that the song of the Louisiana water-thrush gains over that of its tuneful rival by partaking somewhat of the nature of its wild surroundings, and that its song is enhanced by its accompaniments—the murmur of the woodland brook and the whisper of the foliage—among which it is heard. Quite a number of our birds habitually teeter or wag their tails, but few as persistently as the water-thrushes.

KENTUCKY WARBLER (Oporornis formosus)

(For text, see page 99)







CONNECTICUT WARBLER
MOURNING WARBLER
MACGILLIVRAY WARBLER

HOODED WARBLER
Male and Female



WILSON WARBLER
Male and Female

CANADA WARBLER

CONNECTICUT WARBLER (Oporornis agilis)

Range: Breeds in Canadian Zone from Manitoba to central Minnesota and northern Michigan; winters in South America, probably in Colombia and Brazil.

Discovered by Wilson in Connecticut early in the last century, the Connecticut warbler remained almost unknown for many years until, September 7, 1870, I found it numerous in the fresh pond swamps of Cambridge. The bird thus rediscovered rapidly came into the limelight, and there are few eastern observers of the present day who are not tolerably familiar with the appearance and habits of this warbler. In fall it is common throughout eastern United States in low, swampy thickets. It habitually feeds on the ground, and is so silent and shy as easily to escape the notice even of one on the lookout for it, especially as its single chirp of alarm is infrequently uttered. In fact, the only way to be sure that one or more Connecticut warblers are not concealed in the shrubbery of a suspected locality is to beat over it systematically, not once, but many times.

When startled, the warbler flies noiselessly to the nearest shaded perch, and there sits motionless, watching the intruder, till it decides either to renew its interrupted search for food or to seek some distant place, far from the danger of intrusion. Under such circumstances its motions are highly suggestive of the staid and quiet thrushes, and in no respect similar to the sprightly warblers. The Connecticut is one of the few species that for some reason choose distinct routes of migration, as in spring it passes up the Mississippi Valley instead of through the Atlantic Coast States, which form its southern route in fall. The bird is known to breed in Michigan, Wisconsin, Minnesota, Manitoba, and elsewhere in the north. The only nest so far found, however, appears to be one discovered by Seton in Manitoba. As was to be expected, it was on the ground.

MOURNING WARBLER (Oporornis philadelphia)

Range: Breeds in lower Canadian Zone from east central Alberta, southern Saskatchewan, southwestern Keewatin, Nova Scotia, and Magdalen Islands south to central Minnesota, Michigan, central Ontario, and mountains of New York, Pennsylvania, Massachusetts, and West Virginia; winters from Nicaragua and Costa Rica to Colombia and Ecuador.

The mourning warbler is a near cousin of the Maryland yellow-throat and, like that bird, sticks rather closely to Mother Earth, being no lover of tree-tops. Unlike the yellow-throat, however, it is one of the rarest of the family, and few ornithologists have ever enjoyed opportunity to get on familiar terms with it and to observe its habits adequately.

Most observers, like myself, have come across a few in migration from time to time, chiefly in spring, when the birds' habits may be described in general terms as a combination of those of the Maryland yellow-throat and the Connecticut warbler. During the spring migration it frequents brushly hillsides and damp thickets, and in the nesting season seems partial to briar patches, in which it places its bulky nest of leaves and stalks.

The song is said to be rich and full and has been compared with that of the Maryland yellow-throat and the water-thrush.

MACGILLIVRAY WARBLER (Oporornis tolmiei)

Range: Breeds mainly in the lower Canadian and Transition Zones from central British Columbia, central Alberta, and southern Saskatchewan south to southern California, southern Arizona, and northern New Mexico, and from the Pacific coast to the eastern foothills of the Rocky Mountains and southwestern South Dakota; winters from Lower California to Colombia.

Though closely resembling the mourning warbler in appearance and representing that bird in the west, the Macgillivray warbler differs widely in habits. Thus it is far more generally distributed, both in the mountains and in the lowlands, and is much more numerous. In my own experience I have found it in summer chiefly in moist thickets of willows or other brush along streams, and a suitable locality is rarely without a pair or two. Other observers, however, have found the bird on dry brushy hillsides. This warbler nests from a few inches to a few feet above the ground. It has a short, though pleasing, song which is repeated at brief intervals.

HOODED WARBLER (Wilsonia citrina)

Range: Breeds in Carolinian and Austroriparian Zones from southeastern Nebraska, southern Iowa, southwestern Michigan, central New York, and the lower Connecticut Valley south to Louisiana, Alabama, and Georgia; winters from Vera Cruz and Yucatan to Panama.

While the hooded warbler has a wide range in eastern United States, its center of abundance is the lower Mississippi Valley. It is common only locally and wholly absent from many sections except as a casual migrant. Of the bird, one of our most beautiful warblers, Chapman says:

"To my mind there is no warbler to which that much misused word 'lovely' may be so aptly applied as to the present species. Its beauty of plumage, charm of voice, and gentleness of demeanor make it indeed not only a lovely, but a truly lovable bird. Doubtless, also, the nature of the hooded warbler's haunts increases its attractiveness not merely because these well-watered woodlands are in themselves inviting, but because they bring the bird down to our level. This creates a sense of companionship which we do not feel with the bird ranging high above us, and at the same time it permits us to see this exquisitely clad creature under most favorable conditions."

WILSON WARBLER (Wilsonia pusilla pusilla)

(For text, see page 90)

CANADA WARBLER (Wilsonia canadensis)

(For text, see page 90)

THE WORLD RECORD FOR FEATHERED FRIENDS

THE world's record for density of bird population is held by a farm within ten miles of the National Capital, near Bethesda, Md. It is owned by Mr. Gilbert Grosvenor, the Director and Editor of the National Geographic Society.

In 1913 Mr. Grosvenor bought a farm of 100 acres, half in forest and half in field, about four miles from the District of Columbia, moving there early in the spring.

Being interested in the work of the Audubon societies, he determined to see what he and his family could do to get birds around the home. He had such success that Dr. H. W. Henshaw, Chief of the U. S. Biological Survey of the Department of Agriculture, became interested and delegated Dr. Wells W. Cooke to visit the Grosvenor farm.

Dr. Cooke found so many birds there that he suggested a census of those living on an acre or two adjacent to the house, as he thought the count would establish a world's record. Up to that time the record was held by a family at Chevy Chase, Md., who had attracted thirteen pairs of birds to half an acre.

The prospect of establishing a world's record was so inviting to the Grosvenor family that they took a census of the nesting birds on an acre adjoining their house and barns, with the result that they found 59 pairs of birds with young or eggs in the nest on that acre, the highest number of land birds inhabiting one acre that has yet been reported to the Department of Agriculture or to any Audubon Society. A similar census was made of a second acre, and it was found that this acre had 33 pairs of nesting birds.

In an article contributed to *Bird-Lore*, the bimonthly organ of the Audubon societies of the United States, Mr. Grosvenor tells a fascinating story of the birds which have come to dwell with them at "Wild Acres," as his farm is named.

"Wild Acres" is a typical Maryland farm, with an old-fashioned farm-house surrounded by an apple and pear orchard, with a vegetable garden, hedges, and open fields. Surrounding the fields is a tract of 50 acres in woods, with a beautiful stream and several springs scattered around in both the fields and the woods.

The bird census taken in the week of June 15 to June 21 showed that on the first acre they had one pair of flickers, one pair of blackbirds, one of yellow warblers, two of orchard orioles, two of catbirds, one of song sparrows, two of chipping sparrows, one of phœbes, 14 of house wrens, seven of robins, one of kingbirds, and 26 of martins.

On the second acre there were one pair each of song sparrows, Carolina wrens, flickers, Maryland yellow-throats, brown thrashers, catbirds, chipping sparrows, screech-owls, and towhees. There were also 18 pairs of martins, four of house wrens, and two of robins.

"I attribute our success primarily," writes Mr. Grosvenor, "to shooting the English sparrows and driving the cats away, to putting up many boxes, to keeping fresh water handy at all times, etc. We do everything we can for the comfort of our birds. For instance, we put on twigs little pieces of the oiled paper that our butter was wrapped in, and we left mud in convenient places for the martins. The catbirds used the oiled paper for their nests; in fact, they used all kinds of scraps. Imagine the delight of the family when, on examining one of the catbirds' nests in the autumn, we found one of the children's hair-ribbons and also a piece of an old dress of the baby!

"We had read a great deal about how tame birds become when they are protected, but we were constantly amazed at the quickness with which they perceived the care taken of them. Perhaps the most remarkable nest was that of a phœbe, which was built under the cornice of the piazza within reach of my hand. We had a little school in the morning at the house, and ten children were continually running up and down the piazza,

shouting at the top of their voices; but the phœbe went on building her nest, then hatched her eggs, and fed her young without fear, though she could see every one and every one could see her.

"I was also surprised to find how friendly birds, even of the same species, can become. For instance, we had 14 pairs of wrens on a single acre, some of the nests being not more than 15 feet apart. We also had robins' nests only 12 yards apart. The bluebirds, on the other hand, do not like each other, and would not tolerate another pair of bluebirds nearer than 100 yards.

"The first year we had no flickers, but there was a pair nesting in an old apple tree on our neighbors' property. During the winter the tree was blown down and our oldest son obtained permission to get it. He cut out the portion of the tree which contained the nest, cleaned out the hole, and then hung the nest in a dying cherry tree. The nest was not more than ten yards from the house, but was taken possession of in 1914 and again in 1915.

"We had, in 1915, seventy-five pairs of martins in an area approximating ten acres, and expect to have a great many more than this in 1916. We had one pair of red-throated hawks nesting in our apple orchard, and kept them for two years; but they developed such a fondness for poultry, having frequently been caught thieving, that finally we had to shoot them. We have in the woods a splendid pair of barred owls. They come around the barns at night, and I suspect them also of attempts at chicken thieving, but they are too handsome and rare a bird in these parts to shoot. There is nothing good to be said of the screech-owl, which we suspect of having been the cause of the mysterious disappearance of many young birds from the nests.

"If any one wants excitement, I suggest that he buy or borrow a stuffed owl and put it out in the garden in the daytime during the nesting season. All of the birds in the neighborhood will soon congregate, and the children will learn them quicker than in any other way."

A census of the species in the 100 acres of fields and woods in Mr. Grosvenor's "Wild Acres" shows that last summer 60 species were nesting on the farm, and it is expected that these will be added to every year.

Commenting upon the story of the birds at "Wild Acres," Dr. Frank Chapman, the editor of *Bird-Lore,* says:

"The birds which Mr. Grosvenor has brought about him are unquestionably more his birds than if he had shot them and placed their skins in a cabinet. With their death his responsibility for their welfare would cease. But a living bird, to which we feel we owe protection, is exposed to so many dangers that our fears for its safety are correspondingly aroused. These birds of our garden are our guests. Through the erection of bird-houses and by other means we have invited them to live with us, and when they accept as readily as they have with Mr. Grosvenor they make us realize not only our responsibility, but they awaken the strongest sense of hospitality."



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A FLOCK OF WILD DUCKS FLYING IN THE AIR: ONE OF THE MOST REMARKABLE BIRD PICTURES EVER MADE

The photograph was taken at Lake Merritt, Oakland, California, where, safe from hunter's guns, the wild ducks are fed twice a day. They are leaving the feeding-grounds, and are seen in all conceivable positions. The picture emphasizes the fidelity with which Japanese artists paint birds in flight.

HOW BIRDS CAN TAKE THEIR OWN PORTRAITS

By GEORGE SHIRAS, 3rd

The inventor of flashlight photography of wild animals and birds and of the methods of making animals and birds take their own photographs, and author of numerous articles in the NATIONAL GEOGRAPHIC MAGAZINE, *as follows: "Photographing Wild Game with Flashlight and Camera," with 72 illustrations; "One Season's Game Bag with the Camera," with 70 illustrations; "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon," with 26 illustrations; "The White Sheep, Giant Moose, and Smaller Game of Kenai Peninsula, Alaska," with 62 illustrations; "Wild Animals that Took Their Own Pictures by Day and by Night," with 67 illustrations, and "Nature's Transformation at Panama," with 36 illustrations and 2 colored maps.*

ANY ANIMAL or bird and many a reptile, however large or small, agile or cunning, may have its picture faithfully recorded during daylight or darkness, without the immediate presence of a human assistant.

While most birds and daylight-feeding animals, like the elk, caribou, mountain sheep and goat, and small animals, such as the squirrel and woodchuck, present no insurmountable difficulties in photography, getting a good picture of others is often uncertain or irksome when the game photographer must either await their coming or attempt a near approach.

In many instances, owing to the nocturnal character of the animal, the keenness of scent and vision, with the habit of skulking in thick underbrush or occupying points of vantage where no approach can be made, I have usually found it a waste of effort to try to get pictures in the ordinary way; for, even if occasionally successful, the loss of time can be avoided by the use of the set camera.

To meet the difficulties of self-photography by creatures of the forest, I have developed methods suitable to the habits of each animal and bird subject. In the main I have used many of the devices of the trapper rather than the hunter, substituting the automatic camera for the trap and using the same baits and scents in favorable localities during the season of the year when success was likely.

The greatest immediate pleasure which comes to the camera hunter when, on foot, he can successfully stalk, or in a canoe quietly paddle up to, a big-game animal, and at other times get pictures from the recess of a well-concealed blind, can still be followed while, at the same time, there are secreted in the forest or along the waterways several cameras capable of picturing the living form of many an elusive animal, and that, too, without the loss of time or patience.

In this branch of photography one should have a fair knowledge of the habits and range of the animal sought; for while there are many—if they can be located—that will seize almost any kind of bait, regardless of human scent or the appearance of a poorly concealed camera, such as the raccoon, opossum, skunk, muskrat, woodchuck, rabbit, or squirrel; yet in the case of others, like the beaver, bear, fox, wolf, and deer, one should follow the cautious methods of the trapper when he erects a dead-fall, sets a steel trap, or puts out poisoned bait.

Then, toward the close of the day, when the fading light puts an end to the use of the hand camera, one may expectantly visit the camera traps, and if the string across the runway is broken or the bait disturbed, the surroundings should be carefully examined for the hoof-marks of a frightened deer or the scratches made by the claws of some carnivorous animal fleeing on the click of the revolving shutter. If, however, no visitor has come, the flashlight machine may be adjusted and the shutter of the camera reset at a much slower speed, so that when some night prowler presses against the string or eagerly pulls at the



Photo by George Shiras, 3rd

FLORIDA QUAIL TAKE THEIR OWN PICTURES

Unexpectedly a flock of seven quail discovered the seeds put out for smaller birds. Six pictures were taken by the author pulling the string and two the quail took during his absence. In the above group are four cocks and two females. Note that the tugging of the cock, which is attempting to detach a seed on the string, releases the camera shutter.

bait the flash will illuminate the surroundings while the sensitive plate records the scene.

Then, when the blazing camp-fire accentuates the darkness of the night, the sportsman, lying within the narrow circle of its warmth, may suddenly see a dazzling column of light ascend on a distant hillside, or illuminating with a momentary flutter the gloomy valley of some water-course; and in a few seconds the deep, dull boom of the exploding powder suggests an animal fleeing in needless terror from a spot where the weapon contained no bullet and where its recorded visit will prove a source of pleasure to one who meant it no bodily harm. As I usually explode a compound of magnesium powder in a hermetically sealed box—to insure higher speed and the exclusion of moisture—I have sometimes heard the report at a distance of three miles and noticed the flash at a much further distance.

Therefore one can imagine the surprise and terror of some timid animal when experiencing the first dazzling explosion. Yet, as will be shown later, the pangs of hunger or the cravings for some particularly choice food will lead many of these animals to return to the interrupted feast, and in the course of time the blinding light and roar seem to be regarded as a harmless manifestation of nature, like thunder or lightning. And then one may, if he desires, get a series of interesting night pictures, in every attitude and action. An example of this was shown by an article in this magazine several years ago, illustrating the nightly visits of the same coon to bait placed at the edge of a little lake.*

In taking a picture from a canoe by flashlight one must be able to judge short distances accurately in order to have the animal in proper focus. In a different way, but for the same reason, it is equally important that automatically taken pictures should come within the focus for which the camera was set in advance. With the bait placed at a given distance, little trouble arises, but when the animal sought is a deer or a moose coming to the water or feeding grounds, the problem becomes more difficult, because the intercepting string must be touched at the point where the animal will be in sharp focus.

Whenever animals are traveling on a well-defined runway, a string running to a stake on the opposite side will insure a good picture, because the camera can be previously focused on the runway; but if such animals are to be photographed when wandering along the shores of a pond or traveling in a creek bottom, it is important that natural conditions be taken advantage of, so that the animal will be forced to pass at a fixed distance from the camera, as will be the case where the shore is narrowed by driftwood, rocks, or mud-holes.

Quite often temporarily erected obstructions will accomplish the same purpose, provided no scent is left and the material used is in harmony with the surroundings. Otherwise, in order to avoid having the camera sprung at a point where it is not in focus, the string can be run along the ground and then raised a foot or two high by forked sticks at the spot where the animal is most likely to pass.

Usually I have encamped near enough to hear the report of the flashlight employed, but sometimes the camera may be set many miles away, or perhaps I am in town or on a side trip, in which case it has not been unusual for the camera to remain unvisited for a week or ten days. But this is of little consequence; for, with the shutter opening and closing automatically, the exposed plate is safe until called for.

The alphabet for the beginner in wild-life photography usually comprises nesting birds of the neighborhood, chipmunks, the lazy and sun-loving woodchuck, or the stolid porcupine, and even then many difficulties confront the novice, the overcoming of which opens the door for picturing rarer or more active subjects.

Some who take up camera hunting become discouraged by early failures and are unable to see how such an instrument

* See "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon," NATIONAL GEOGRAPHIC MAGAZINE, June, 1911.



BUZZARD FIRING FLASHLIGHT IN DAYTIME

The left wing became involved in string tied to bait and half of the pinion feathers were pulled out. These birds became such a nuisance that when meat bait was used the flash was not set until dusk.

can ever be a satisfactory substitute for the sportsman's gun. Others, with their interest only intensified by defeat, continue on until won over by the attractiveness of a contest where success costs no life or an awkwardly handled camera leaves no wounded animal to die a lingering death.

Most birds are photographed about their nests, or in the great rookeries and breeding resorts of the sea-coast and inland waters, when the domestic duties of the parents or when the fearlessness manifested by many birds under colonization makes such photography pleasant and generally successful.

But there are times of the year and localities, as well as different birds, where an approach is difficult. Often a good method of getting birds singly or in flocks is the set camera.

Some years ago I tried to get a group picture of comparatively tame buzzards and vultures which daily circled about my southern cottage; but even when I was in a well-concealed retreat these keen-eyed birds knew of my presence and would not alight in the vicinity of the bait. After an hour's wait I set out a smaller camera, covered with palmetto leaves, within ten feet of the meat, and tying a piece of this to a string, I withdrew. Returning in half an hour, the bait was all gone and the pulling string in a hopeless tangle. The group obtained included both the black vulture and the turkey buzzard (see page 179).

MOUSE-TRAP WILL SERVE AS A TRIGGER

Almost any bird of prey, like the hawk, owl, eagle, or condor, will pull energetically on the string; but in the case of smaller or more timid birds it is advisable to use an auxiliary spring trigger, or even a common mouse-trap will do, since the release of the wire collar to which the string may be attached only requires the slightest pressure.

Having for several seasons scattered grain about an orange grove in Florida to attract local birds more regularly, I took a few of their pictures with the automatic camera, the focal plane shutter being set at 1/400 of a second. For the quail and ground doves I used grains of wheat and sunflower seed strung on a thread (see page 102).

Pictures of birds nesting on sea beaches, in open marshes, or the tundra, where the use of a blind is difficult, may be obtained by concealing the camera in rocks, seaweed, or marsh vegetation. By stretching a thread taut across the nest the brooding bird on reëntering will release the shutter. It is usually best to make the screen for the camera a day in advance, so as not to imperil the fertility of the eggs or the life of very young birds, for strong sunlight and chilling wind are equally fatal. In this way I secured a series of snipe pictures on the eastern shore of Virginia otherwise unobtainable.

AMERICAN GAME BIRDS

Avian Fleets Which Hover Over Our Forests and Frequent the Shores of Our Streams, Lakes, and Seaboard Constitute a Great National Asset, But They Must Be Protected, Otherwise Extermination Threatens Many

By HENRY W. HENSHAW

With Illustrations from Paintings by Louis Agassiz Fuertes

FROM the time of the earliest settlement of the country the wild game of America has proved a national asset of extraordinary value. Nowhere in the world, except in Africa, was there ever greater abundance and variety of wild life.

The forests of America were filled with game birds and animals, large and small; its streams, lakes, and ponds were covered with waterfowl, and its rivers and shores furnished highways for myriads of shorebirds as they passed north and south. Nature would appear to have stocked the continent with lavish hand. Indeed, but for the wild game our predecessors, the Indians, would not have been able to maintain existence, much less to advance as far as they did in the arts that lift peoples toward the plane of civilization.

And at first our own forebears were scarcely less dependent than the aborigines upon game for food. Many years of toil and struggle had to pass before the rude husbandry of the colonists sufficed to free them measurably from dependence on venison and wild fowl.

Nor will any student of American history doubt that, but for the services of our pioneer hunters and trappers who literally hunted and trapped their way from the Atlantic to the Pacific, the course of empire westward would have been halted for decades. As a consequence, the settlement of much of our fair land would have been long delayed, if, indeed, the land had not passed into the possession of other peoples.

Moreover, it was in the pursuit of game that the hardy frontiersmen developed skill as marksmen and acquired many of the rude border accomplishments which later made them effective soldiers in the war for independence.

Game existed everywhere, for the Indian, though wasteful of wild life and knowing naught of game laws, took what toll he would of the game about him, and yet made no apparent impression on its quantity; so that it passed into the hands of his successors, along with his lands, practically in its original state.

AMERICAN WATERFOWL AND SHOREBIRDS

And what a rich heritage it was! In addition to the upland game birds of the forests and open glades, great numbers of ducks and shorebirds found on our western prairies and in the innumerable lakes and ponds the food, solitude, and safety necessary during the nesting period. More important still as a nursery for wild fowl and shorebirds were, and

still are, the tundras of Alaska and the barren grounds that, dotted with countless lakes and rivers, stretch to the Arctic.

Here, in these northern wilds, solitude reigns supreme, and vast multitudes of waterfowl breed, assured of both food and safety. On these Arctic plains Nature has provided in a remarkable way for her winged servants by supplying an inexhaustible crop of berries. As the short summer season wanes the berries ripen and furnish a nutritious food upon which the waterfowl fatten and gain strength for their long southern journey. Then the Ice King takes the remainder of the crop in charge, wraps it in a mantle of snow and ice, and keeps it safe in Nature's cold storage, ready for delivery in spring to the hungry migrants. Without this storehouse of berries it is doubtful if our waterfowl could sustain life in the Arctic, and the so-called barrens, instead of being a nursery for myriads of fowl, would indeed be barren so far as bird life is concerned.

When the short Arctic summer closes and the young birds acquire strength for the journey, multitudes of ducks, geese, swans, and shorebirds, anticipating the Arctic winter, wing their way to southern lands. Including these winged hordes from the Arctic that visit our territory and the birds that nest within our own limits, America possesses upward of 200 kinds of game birds, large and small, many of which are in the front rank, whether viewed merely from the economic standpoint as food or through the eyes of the sportsman.

FORMER ABUNDANCE OF GAME BIRDS

While the aggregate numbers of game birds are very great, they sink into insignificance when compared with their former abundance. The statements of the early chroniclers regarding the multitudes of ducks, plover, and wild pigeons almost defy belief. When, in the records of the first part of the last century, one reads of clouds of pigeons that required three days to pass a given point in a continuous moving stream, and again of flocks estimated to contain more than two billion birds, credulity is taxed to the limit.

Yet not only one such flock was observed, but they were of periodic occurrence during many years of our early history, and the accounts of them are too well attested to be doubted. As throwing a curious sidelight on the abundance of wild fowl and the hardships to which the slaves of the period were subjected, I quote a paragraph from Grinnell (American Game Bird Shooting), who states that "in early days slave owners, who hired out their slaves, stipulated in the contract that canvasback ducks should not be fed to them more than twice each week"!

CAUSES OF DECREASE OF GAME BIRDS

What, then, has become of the teeming millions that once possessed the land? Before attempting to answer this question it may be well briefly to review certain general causes that contribute to the depletion of the ranks of game birds. Among these may be mentioned natural diseases; natural enemies, both winged and four-footed; forest, brush, and prairie fires; the drainage of swamps and the general elimination of nesting grounds by the advance of agriculture; and finally, most potent of all the agencies of destruction—firearms.

From the nature of things, no data are available to show exactly the relative importance of the above causes of decrease or of their separate or combined effect. Nevertheless we can arrive at an approximate idea of their relative effect.

Natural diseases seem to play a comparatively unimportant part in causing the death of birds, except perhaps indirectly. In a state of undisturbed nature there are few sick or old birds, for the reason that the sick, the heedless, and the old, as soon as their strength begins to fail, are promptly eliminated by natural enemies, who, while foes of individual bird life, nevertheless do good service to the species in keeping the vigor of the stock at a high standard by promptly weeding out the unfit.

While the annual loss of game birds by attacks of predatory birds and mammals is no doubt very great, it is to be noted that it is relatively far less at the present time than formerly, owing to the general

destruction of birds of prey and of wild four-footed animals of whatever name or nature.

The contrary is true of that predatory animal, the house cat. Never were house cats more destructive of bird life than now. While the annual loss of insectivorous birds by them is far greater than that of game birds, the loss of woodcock, quail, grouse, and upland-breeding shorebirds is by no means small. Taking into account bird life in general, the cat is undoubtedly the most destructive mammal we have, and the aggregate number of birds annually killed by them in the United States is enormous.

Of late years serious losses have been reported among the ducks of certain localities in the West. The causes are yet obscure, but they are probably not due to epidemics, as commonly believed. They will probably prove to be very local and of comparatively modern origin, and to be dependent on drainage contaminations or unnatural crowding into unfavorable feeding grounds. It is hence highly probable that such losses can be eliminated either in whole or in part.

Before the coming of the whites, forest and prairie fires were due to lightning or were purposely set by the Indians to facilitate the pursuit of large game. While they were no doubt common at certain seasons and probably fatal to many birds, they were too insignificant to have played an important part in the reduction of numbers.

FIREARMS THE CHIEF CAUSE OF DECREASE

The destruction of former breeding grounds through drainage and the general advance of agriculture is a very important cause of the diminution of certain species. But while agriculture usurps the breeding grounds of many kinds, especially ducks and geese, its effect in this direction is to some extent lessened, since it prepares the way for other species, like the upland game birds, and furnishes food and breeding grounds for them. While these and other causes that might be enumerated have tended to diminish the numbers of game birds, even taken collectively they have played only a minor part in the great reduction of these birds as a whole.

It is the gun that has been the chief cause of the destruction of our game, large and small. Whatever weight may be attached to other causes, these fade into insignificance when compared with the effect of firearms.

It is nothing short of marvelous how little time was required by the early pioneers, even with the crude firearms of the time, to make an impression on the abundance of American game. What the Indian with his bow and arrow and his rude nets failed to do in thousands of years, the handful of white men with powder and shot accomplished in a few decades.

Writing within 40 years after the first settlement in New England, Josselyn states that already the wild pigeon had diminished greatly, "the English taking them with nets"; and he adds that the English and Indians, who by this time were supplied with guns, had "destroyed the breed of wild turkeys, so that even at that early day it was very rare to meet one in the woods."

Thus two of our most important game birds, in less than half a century after the first settlements, had already begun to disappear from the neighborhood of the New England colonies. Nor is there reason to believe that it was different in other parts of the country. Game abounded, was needed for food, the supply seemed inexhaustible, and it was shot regardless of consequences, and at first, no doubt, without thought of them.

It is undoubtedly true that up to the present time far more strenuous efforts have been made in this country to destroy game than to preserve it. Even today a vastly greater number of individuals are interested in game as something to kill than as something which deserves protection. Clubs having for their chief object the pursuit of game of all kinds have existed since early days; but organizations having for their chief object the preservation of game are relatively few in number and of comparatively recent origin.

AMERICA A SPORTSMAN'S PARADISE

America has always been a paradise for sportsmen, but of late years the number of those whose chief relaxation is the pursuit of game has greatly increased,

AMERICAN MERGANSER (Mergus americanus).

Range: Breeds from southern Alaska, southern Yukon, Great Slave Lake, central Keewatin, southern Ungava, and Newfoundland south to central Oregon, southern South Dakota, southern Minnesota, central Michigan, northern New York and northern New England; winters from Aleutian Islands, British Columbia, Idaho, northern Colorado, southern Wisconsin, southern Ontario, northern New England, and New Brunswick south to Lower California, northern Mexico, Texas, Louisiana, and Florida.

The narrow, serrated bill of the goosander as contrasted with the broad, smooth bills of most ducks would suggest to the merest tyro that its habits must differ widely from those of most of its kin. In fact, the goosander's bill, with its saw-like teeth, is specially adapted to seizing and holding slippery prey of various kinds including small fish which, though not its sole food, constitute the most important part of it. Water insects, frogs, and crawfish, are by no means disdained. The goosander's long, narrow body eminently fits it for swift progress under water where it spends much of its time. Cold weather and ice have no terrors for it, and the bird may winter wherever open water is assured, provided only that food is abundant. Not many goosanders remain within our territory to breed, and these retire to the mountains where they find along the foaming mountain torrents the surroundings they prefer. The merganser follows the general custom among ducks and nests on the ground, but unlike many it nests also in hollows of trees. As it does not associate in large flocks and has learned to care well for its safety, the bird is holding its own very well.

MALLARD (Anas platyrhynchos).

Range: Breeds from Pribilof Islands, northwestern Alaska, northern Mackenzie, central Keewatin, and Greenland south to Lower California, southern New Mexico, southern Kansas, central Missouri and southern Indiana; winters from Aleutian Islands, central Alaska, central Montana, Nebraska, southern Wisconsin, northern Indiana, Ohio, Maryland, south to Mexico, the Lesser Antilles, and Panama.

This fine duck is monopolized by no one country nor even continent, but includes in its range both hemispheres. Its size, abundance, and excellent flavor make it perhaps the most important of its family, and its value to mankind is still further enhanced by the fact that it lends itself so readily to domestication that many of our domestic varieties are derived from it. Before the settlement of the West the ponds and sloughs swarmed with mallards, which nested there by thousands, and in fall and winter, as migrants and winter residents, covered the water courses to the south. To-day there is a very different story to tell. Many of the mallards' old breeding grounds are now farms, and the bird is now represented by a few hundreds where once there were myriads. The mallard is one of our most omnivorous ducks, and nothing in the way of mast, grain, or small animal life comes amiss. In the far West it has the habit, shared to the same extent by no other duck, of resorting to the stubble for waste grain, and the epicure need ask for nothing more delicious than a fat corn- or wheat-fed mallard. The domestication of this duck is easy, and the owners of estates with suitable ponds can render good service in the cause of wild-fowl preservation by raising mallards for liberation.

RED-BREASTED MERGANSER (Mergus serrator).

Range: Breeds from Arctic coast of Alaska, northern Mackenzie, Cumberland Sound, and Greenland (lat. 73°) south to southern British Columbia, southern Alberta, southern Minnesota, central Wisconsin, northern New York, and southern Maine; winters in southern Greenland, Commander Islands, and from southern British Columbia, Utah, Colorado, southern Wisconsin, southern Ontario, and Maine south to southern Lower California, Louisiana, and Florida.

The red-breasted merganser is the second of our mergansers in size, and while its habits in general correspond well with those of the larger goosander, they differ in some important respects. The red-breast, for instance, frequents salt water far more than its relative, though it, too, inhabits the interior lakes and ponds. It swims and dives with wonderful skill, and in clear, rapid mountain streams, even the swift and wary trout is not safe from its prowess. This merganser used to breed rather commonly in New England, and it still nests in the northern parts, though in diminished numbers. Apparently it never breeds in hollow trees but conceals its nest on the ground among rocks or bushes. Like its larger relative, this duck does not "flock," and the little parties of five or eight probably represent parents and young, which from motives of attachment or safety, keep together. Eaton ascribes to this merganser a habit which would argue unusual intelligence and cooperative ability. He says, "These mergansers are often observed to hunt in company, a large flock sometimes advancing with wide, extended front, driving the fish before them and diving simultaneously, so that whichever way their prey may dart there is a serrated beak and capacious gullet ready to receive them."

HOODED MERGANSER (Lophodytes cucullatus) (See page 126).

BLACK DUCK (Anas rubripes).

Range: Breeds from central Keewatin and northern Ungava south to northern Wisconsin, northern Indiana, and southern Maryland; winters from Nova Scotia south to southern Louisiana and Colorado; ranges west in migration to Nebraska and central Kansas.

The black duck is essentially confined to the Eastern States, usually migrating no farther west than Kansas, and that rarely. It is a favorite object of pursuit by sportsmen, and in the struggle to maintain existence has learned its lesson so well that it is still comparatively numerous in localities where less wary species would long ago have been exterminated. Originally a diurnal-feeding species, like most ducks, persecution has taught the black duck to seek safety on the broad ocean during the hours of daylight, and to resort to inland ponds for the purpose of feeding only after sunset. In order to protect this and other waterfowl one of the regulations under the Federal migratory bird law forbids shooting after sunset and before sunrise, and the enforcement of this regulation will probably do more for the preservation of the black duck than any other provision that could be devised. That protection for this species is sorely needed appears from the fact that throughout its range, except in a few localities, the black duck has of late years steadily diminished in numbers.

The black duck is excellent eating, and as experiments prove that it can be reared in captivity it may be raised for the market or be freed for restocking suitable localities.

The Florida black duck is a closely allied species, with similar habits, and is resident in Florida and along the Gulf Coast.



Male Female Male Female

AMERICAN MERGANSER RED-BREASTED MERGANSER



Female Male

HOODED MERGANSER



Male Female

MALLARD



BLACK DUCK

GADWALL (Chaulelasmus streperus) (See page 126).

GREEN-WINGED TEAL (Nettion carolinense).

Range: Breeds from Aleutian Islands, northwestern Alaska, northern Mackenzie, central Keewatin, northern Ungava, and Newfoundland south to central California, northern New Mexico, northern Nebraska, northern Illinois, southern Ontario, Quebec, and New Brunswick; winters from Aleutian Islands, British Columbia, Nevada, southern Nebraska, northern Indiana, western New York, and Rhode Island south to southern Lower California, the West Indies, and Honduras.

Though still numerous in parts of the far West, the green-winged teal has ceased to be even common in the Atlantic States, where it is likely soon to be quite exterminated. The green-wing does not frequent large lakes and open water but shows a marked preference for fresh-water marshes and grass-fringed ditches. It is remarkable in how small a waterway a flock will hide away and if undisturbed feed contentedly for hours. The reasons for the marked decrease in the number of this species are not far to seek. Few ducks decoy better, and when a number of the flock are stretched on the water, the survivors will once and again return to their comrades as if totally unable to grasp the situation or to realize the necessity of saving their own lives by flight. This teal is not much of a diver, for the shallows in which it usually feeds do not require exercise of the art. Many will attest to the excellence of roast teal, but few will agree with Audubon in his opinion that when teal are feeding on soaked rice or wild oats they are far superior to the canvas-back.

BLUE-WINGED TEAL (Querquedula discors).

Range: Breeds from central British Columbia, Great Slave Lake, central Ungava, and Newfoundland south to central Oregon, northern Nevada, northern New Mexico, central Missouri, southern Indiana, northern Ohio, western New York, and Maine; winters from southern British Columbia, Arizona, southern Illinois, Maryland, and Delaware south to the West Indies and South America as far as Brazil and Chile.

Formerly abundant and nesting over much of eastern United States, the blue-wing still inhabits most of its former range, but is numerous only in the Middle West. Though found west of the Rockies it is there replaced for the most part by the cinnamon teal. Its habits may be described in much the same terms as those of its congener, the green-wing. Like that bird, it also is a lover of fresh-water ponds and streams with grassy banks. The blue-wing migrates south early, and teal shooting in early September in some localities is one of the sporting events of the year. Extremely fond of wild rice, this duck is generally regarded as a tidbit, and it is at its best when it has fattened on this nutritious seed. Though extremely swift of wing, its speed avails it little in the long run since it is tame and unsuspicious, decoys well, and is easily approached and potted when feeding in its grassy coverts. How much the abolition of spring shooting will accomplish for this and the green-wing remains to be seen. Should it fail, then the most stringent protective measures as to short open season and bag limit will have to be adopted if these attractive little teal are to remain with us.

BALDPATE (Mareca americana).

Range: Breeds from northwestern Alaska, northern Mackenzie, and central Keewatin south to Oregon, Nevada, Utah, Colorado, Kansas, southern Wisconsin, and northern Indiana; winters from southern British Columbia, Arizona, southern Illinois, Maryland, and Delaware south to southern Lower California, the West Indies, and Costa Rica.

The beautiful baldpate is widespread over the fresh-water lakes and ponds of the United States from ocean to ocean. Formerly this bird nested in great numbers in the Western States, but of recent years its nesting grounds have been greatly restricted, and now most of the ducks that visit the United States come from farther north. The baldpate used to be one of the most abundant of ducks, and only recently was to be met with in large flocks, but it has been so greatly reduced in numbers by sportsmen and market gunners, that it can be said to be abundant in only a few localities. When disturbed in ponds near the coast, it has learned to find safety on the ocean, returning to its feeding grounds only when it thinks all danger has passed. It has become one of the wariest of ducks and, like the black duck, has reversed its natural habits in many localities and become a night feeder, devoting the hours of daylight to safeguarding its life by incessant watchfulness. Like most other ducks, the baldpate is fond of wild celery, but as its skill as a diver is small, it essays the role of highwayman, and when the canvas-back or redhead appears on the surface with a bill full of the coveted grass, the fruit of honest toil, it snatches the booty and makes off with it.

EUROPEAN WIDGEON (Mareca penelope).

Range: Occurs occasionally in winter and in migration from Wisconsin, Michigan, New York, Nova Scotia, Newfoundland, and Greenland south to Nebraska, Missouri, Indiana, Ohio, North Carolina, and Florida, and in Alaska, British Columbia, and California.

In general appearance the European widgeon rather closely resembles our baldpate. The males are easily identified, but a rather careful comparison is needed to distinguish the females. For one thing the head and throat of the female European widgeon are browner than the corresponding parts of our baldpate. A better distinguishing mark, however, is found in the axillars, or long feathers under the wings of both sexes, as noted by Bangs. In our baldpate these are white, while in the European widgeon they are grey. Particular attention is directed to these distinguishing marks, as sportsmen should know the two birds apart, and thus be enabled to record the fact when they bring to bag the European widgeon. The bird has long been known to occur in our waters, but its presence has been thought to be only casual. Of late years it appears to seek our shores in increasing numbers; at all events it is being reported oftener. This is probably due less to an actual increase of numbers than to the fact that sportsmen are becoming better acquainted with its appearance. The bird may indeed prove to be, as Forbush believes, a permanent resident of North America. There are more records of its occurrence along our Atlantic coast than elsewhere, but the bird has been found also in Nebraska, California, and Alaska. The habits of the European widgeon while in our waters offer nothing particularly worthy of note, as distinguished from those of our own baldpate. The call note of the male, Saunders tells us, is a shrill whistling "whe'e-you," whence the local names "whewduck" and "whewer."

CINNAMON TEAL (Querquedula cyanoptera) (See page 126).

SHOVELER (Spatula clypeata) (See page 126).



Male Female

GADWALL



Female Male Male

BALDPATE EUROPEAN WIDGEON



Male Female Male Female

GREEN-WINGED TEAL BLUE-WINGED TEAL



Male Female Female Male

CINNAMON TEAL SHOVELLER

PINTAIL (Dafila acuta).

Range: Breeds on Arctic coast from Alaska to Keewatin and south to southern California, southern Colorado, northern Nebraska, northern Iowa, and northern Illinois; winters from southern British Columbia, Nevada, Arizona, southern Missouri, southern Wisconsin, southern Ohio, and Delaware south to Porto Rico and Panama.

The pintail, one of our most beautiful ducks, is easy of recognition owing to its long slender neck and elongated pointed tail. The latter has caused it to be known locally in England as the "sea pheasant." It is no longer common in the Eastern States but continues to exist in considerable numbers in the West. It is swift of wing, and an old pintail coming down wind will tax the nerve and skill of the most experienced sportsman. In California I once witnessed a life and death race between an adult male pintail and a prairie falcon. The duck covered a half mile at its topmost speed, but notwithstanding its swiftness, the falcon outmatched it, and would have dined on duck that October day had not the fowl, apparently realizing the extremity of its danger, swerved in a half circle toward me, the interested spectator, when the falcon, too distrustful of man to follow, gave up the chase in disgust. Most wild ducks are fond of berries, and Nelson states that in far-off Alaska in August the pintail fattens on berries and becomes the most delicious waterfowl of the region. The pintail is one of the few ducks that braves the long two-thousand-mile trip from the Aleutians to the Hawaiian group apparently for the pleasure of wintering in those sunny islands.

CANVAS-BACK (Marila valisineria).

Range: Breeds from central British Columbia, Fort Yukon, Great Slave Lake, and southwestern Keewatin south to Oregon, northern Nevada, Nebraska, and southern Minnesota; winters from southern British Columbia, Nevada, Colorado, Illinois, Pennsylvania, and western New York south to central Mexico (Jalisco) and the Gulf coast.

The canvas-back, perhaps the most famous of American waterfowl, has purchased its fame at a price. So highly is it prized by the epicure that to-day he who can afford to dine on canvas-back sets the mark of luxurious living. Not that the canvas-back differs essentially from other ducks, but its exceptional flavor is due to the fact that its favorite food is "wild celery," a long ribbonlike grass which grows in shallow ponds and estuaries. As the plant roots several feet under the surface, only the diving ducks can secure it and the plebeian kinds have to be content with such floating fragments as they can pick up or can steal from their more aristocratic relatives. In Oregon and Washington the canvas-back lives much upon wapato, a bulblike root formerly a staple article of food among many Indian tribes, and their exceptional flavor is said to be little, if any, inferior to that of the celery-fed canvas-back of the East. Elsewhere the flesh of the canvas-back is in nowise superior to that of other ducks, and in some localities on the west coast, indeed, is inedible because of its rank smell and taste. Thus prized alike by the sportsman and by the epicure the ranks of the canvas-back have been depleted by the relentless pursuit to which it has been subjected. However, the greater number of these ducks breed far to the northward where they are safe, and under present laws their numbers should increase to something like their former abundance.

REDHEAD (Marila americana).

Range: Breeds from southern British Columbia, central Alberta, central Saskatchewan, and southwestern Keewatin south to southern California, Utah, southern South Dakota, southern Minnesota, and southern Wisconsin; winters from southern British Columbia, Utah, New Mexico, Kansas, Illinois, Maryland, Delaware, and Massachusetts south to southern Lower California, central Mexico, and Florida.

In the minds of epicures and sportsmen the redhead is closely associated with the canvas-back. Both species often frequent the same feeding grounds and, as the redhead is as expert at diving as its cousin, it has no difficulty in obtaining its share of the coveted wild celery. This naturally imparts to its flesh the same highly prized flavor which constitutes the canvas-back's chief claim to distinction, and he must possess a delicate taste indeed who can distinguish the difference. Yet, at times there is much in a name and our redhead pays for his taste for celery and his general undesirable likeness to the canvas-back by being sold in the market as bona fide canvas-back. The redhead is much more numerous east of the Rocky Mountains than to the west of that chain and, while many visit the bays and estuaries of the east coast, the duck's preference appears to be for inland lakes and ponds where it subsists upon various aquatic plants, as also upon insects, snails, acorns, beechnuts, and in fact upon almost anything that is edible by waterfowl standards. Under such circumstances its flesh is no whit better than that of a dozen other species. Of late years a serious reduction of the numbers of this fine fowl has occurred, but it is believed that the abolition of spring shooting will materially aid in checking further decrease.

GREATER SCAUP DUCK (Marila marila).

Range: Breeds from Aleutian Islands, northwestern Alaska, Great Slave Lake, and central Keewatin south to southern British Columbia and northern North Dakota; winters from Maine to Florida and the Bahamas, and from Aleutian Islands, Nevada, Colorado, and Lake Ontario south to southern California, southern New Mexico, and southern Texas.

Both on the east and the west coast the scaup duck is emphatically a bay or estuary species and prefers salt or brackish water. Formerly it frequented such localities in flocks of thousands, often associated with the lesser scaup from which it is not readily distinguishable at a distance. Notwithstanding the fact that both scaups breed chiefly in the far North, their numbers have been greatly depleted of recent years, and the immense rafts that formerly used to gladden the heart of the sportsman are things of the past. The greater scaup used to winter in great numbers in the estuaries of the Gulf States, and in the troubled waters of Lake Borgne. In heavy gales, I have seen "rafts" of bobbing, black heads that apparently extended for miles. Even in those days (1871) the scaup had learned wisdom, and in open water it was only with great difficulty that a shot was to be obtained from skiff or sail boat. As the craft approached nearly within range the birds rose in dense masses and settled down a safe distance ahead, to repeat the performance till the patience of the sportsman was exhausted. Both scaups are expert divers, and are formidable competitors of the canvas-back and redhead in their quest for the rootstocks of wild celery. In the interior their food is much like that of other ducks, and many of the insects, snails, and other food they eat, including wild rice, are obtained without the trouble of diving.

LESSER SCAUP DUCK (Marila affinis) (See page 127).

RING-NECKED DUCK (Marila collaris) (See page 127).



Male Female

PINTAIL



Male Female

REDHEAD



Female Male Female

CANVASBACK



Male Female Male Female Male Female

GREATER SCAUP LESSER SCAUP RING-NECKED DUCK

GOLDEN-EYE (Clangula clangula americana).

Range: Breeds from central Alaska, northern Mackenzie, central Keewatin, northern Ungava, and Newfoundland south to southern British Columbia, southern Montana, northern North Dakota, northern Michigan, northern New York, and northern New England; winters from Aleutian Islands, Utah, Nebraska, Minnesota, Lake Erie, Maine, and New Brunswick south to southern California, central Mexico, and Florida.

Though classed in the books as a "bay or sea duck," the golden-eye, or whistler, is partial to broad rivers or estuaries, and formerly abounded in the Eastern States. Though by no means the only duck to make a whistling sound with its wings as it hurtles through the air, the golden-eye "whistles" louder than any other, and sometimes, indeed, announces its approach by its whistling wings before its oncoming form can be distinguished. Certain of our ducks, among them the whistler, have been taught, probably by bitter experience, that there are many four-footed prowlers with a taste for duck eggs, and that a nest full of eggs is never quite safe when entrusted to Mother Earth, no matter how artfully concealed. Hence, these birds, wiser than their relatives, lay their eggs in hollow trees often many feet from the ground, whence at the proper time the young, with or without the aid of their parents, find the way to the nearest water. The whistler is an excellent diver, and in some localities utilizes its skill to procure mussels from the bottom. The bird has not only learned the range of a shotgun to a nicety, but also the dangers that lurk in blinds, sink boats, and the like, and in a general way by cunning and wariness has shown itself well able to care for its safety. Nevertheless, there are few, if any, places where whistlers exist in their former abundance.

BARROW'S GOLDEN-EYE (Clangula islandica).

Range: Breeds from south central Alaska and northwestern Mackenzie to southern Oregon and southern Colorado, and from northern Ungava to central Quebec; winters from southeastern Alaska, central Montana, the Great Lakes, and Gulf of St. Lawrence south to central California, southern Colorado, Nebraska, and New England.

The resemblance which Barrow's golden-eye bears to the common whistler is extraordinarily close. The males, as a glance at the illustration will show, are easily enough distinguished when close by, but to tell the females and young apart with absolute certainty is impossible. It comes to us as a migrant in the late fall and sojourns along our northern borders, where it is often shot and sent to market with the more numerous common whistler.

OLDSQUAW (Harelda hyemalis).

Range: Breeds from islands of Bering Sea, Arctic coast of Alaska, Melville Island, Wellington Channel, Grinnell Land, and northern Greenland south to Aleutian Islands, east-central Mackenzie, northern Hudson Bay, and southeastern Ungava; winters from Aleutian Islands south regularly to Washington, and in southern Greenland, and from Gulf of St. Lawrence south regularly to the Great Lakes and North Carolina.

Breeding, as it does, in far away Arctic lands, and visiting the United States only in late fall and winter, this beautiful and graceful duck is known to only a few and these chiefly sportsmen. The flesh of the old-squaw does not commend itself to civilized palates, and yet under the guise of sport thousands are annually slaughtered, especially in spring, because, forsooth, their swift flight makes them tempting marks for the wing shooter. Bags of two or three hundred are not uncommon, although so little are they esteemed that, as Forbush states, many, both dead and crippled, are allowed to drift away with the tide. The old-squaw has a habit, unusual among ducks, of circling high in air and then descending in spirals with a resounding rush of wings. Flocks of a hundred or more sometimes participate in this pastime, for such it appears. This duck is a master diver and according to Eaton, individuals have been netted in the Great Lakes at the extreme depth of 162 feet. As a family, the ducks are by no means noted for their musical ability, and yet Nelson tells us that during the nesting season in Alaska the male old-squaws utter a series of rich musical notes which are so deep and reed-like that they have earned for the bird among the fur traders the title of "organ duck."

BUFFLEHEAD (Charitonetta albeola).

Range: Breeds from upper Yukon, lower Mackenzie, Great Slave Lake, and central Keewatin south to British Columbia, northern Montana, and central Ontario; winters from Aleutian Islands, British Columbia, Idaho, Colorado, Missouri, southern Michigan, western New York, and New Brunswick south to northern Lower California, central Mexico, and Florida.

The common name of this little duck is strikingly suggestive of its appearance, for the head, with its white markings and fluffy feathers, seems too big for the diminutive neck and body. An equally suggestive name in fall, when it becomes very fat, is "butterball." Though by no means strictly confined to fresh water, the buffle-head prefers fresh water, and is more abundant on the larger lakes and ponds of the far West than in eastern waters. Wherever found, east or west, it is extremely friendly, and when the gunner puts out a flock of wooden decoys our little duck immediately responds to the invitation to alight and be sociable. Taking advantage of this amiable weakness—some might call it stupidity—the gunner has already greatly reduced the number of buffle-heads, and left scarcely a tithe of their former thousands. Very few ducks can dive more quickly at need than the buffle-head, and in this respect it almost rivals the little grebe known as the "water-witch" or "hell diver." This skill as a diver is of great service to the duck in its search for food. It is adept at catching small fish and, perhaps, because of this and of other animal food, its flesh is not greatly esteemed.

HARLEQUIN DUCK (Histrionicus histrionicus).

Range: Breeds from Kowak and Yukon rivers, Alaska, Arctic coast, and Greenland south to southwestern British Columbia, central Mackenzie, northern Ungava, and Newfoundland, south in mountains to central California, southwestern Colorado, northeastern Asia and Iceland; winters on Pacific coast from Aleutian Islands to Monterey, California, in interior to Colorado, Missouri, Lake Michigan, and western New York, and on the Atlantic coast from Gulf of St. Lawrence regularly to Maine.

The name "harlequin" suggests the unusual and somewhat bizarre plumage of this duck which, nevertheless, deserves to be classed among our most beautiful waterfowl. Rare everywhere in the United States except along our northwest coast, the harlequin breeds commonly in Alaska and uncommonly in the States from Colorado and California northward. Unlike most other ducks, the harlequin disdains to nest in the lowlands, but in summer withdraws itself from its kind and hies to the mountain solitudes where it dwells on the swift alpine streams, its only companion the water ouzel. In fall it resorts to the coast and assembles in small bands with flocks of other species, among which the male harlequins are rendered conspicuous by their striking markings.



Female Male

GOLDEN-EYE

Female Male

BARROWS GOLDEN-EYE



Male Female

BUFFLEHEAD



Winter Plumage

OLD SQUAW



Male Female

HARLEQUIN DUCK

STELLER'S EIDER (Polysticta stelleri).

Range: Breeds from Point Barrow, Alaska, to northern coast of Siberia and south to Aleutian Islands: winters on Aleutian Islands and Kenai Peninsula, Alaska, and south on the Asiatic coast to Kuril Islands.

Steller's hardy and beautiful duck is American by virtue of our possession of Alaska, for even in winter it does not venture south as far as either the Atlantic or the Pacific Coast States. According to Nelson the coast and islands of Bering Sea constitute the eastern range of this eider, and it breeds by tens of thousands on the North Siberian coast. Nelson found these ducks rather numerous in the quiet waters of bays and fjords of the Aleutian Islands the last of May, but they were very shy and he failed to secure a single individual. They winter in such of the Alaskan bays as are free from ice, and at this season the natives who depend upon them for winter food kill great numbers. This eider is a true sea duck and Turner notes that it keeps well off shore except in boisterous weather. Needless to say then that its food consists of animal life gleaned from the sea and that the bird is a skillful diver, reaching great depths and staying under a long time, as do eiders generally.

SPECTACLED EIDER (Arctonetta fischeri) (See page 127).

LABRADOR DUCK (Camptorhynchus labradorius).

Range: Formerly, northern Atlantic coasts; supposed to have bred in Labrador; wintered from Nova Scotia south to New Jersey.

The Labrador duck's history is shrouded in mystery. It is now known to be extinct but of the causes of its disappearance we know little or nothing. Occupying as it did such a restricted range, the bird was probably never abundant, at least in historic times. Many years ago George N. Lawrence told me that in his recollection, somewhere probably about 1850, it was by no means uncommon in Fulton Market, and no one at that time appears to have suspected that the bird was in any particular danger of extinction. Apparently its habits were those of a sea duck, and as it could have possessed no great value for the table there would seem to have been no particular incentive for its pursuit. We know so little about the bird that speculation as to the cause of its extinction is useless but, as suggested by Forbush, the slaughter of waterfowl on the Labrador coast in the eighteenth century may have had much to do with it. The lesson to be drawn from its fate is that if a game bird like the Labrador duck can become extinct in historic times from no assignable cause we should be doubly careful not to reduce the numbers of any of our valuable game birds to a point which threatens their future, since when reduced beyond certain limits, the precise limits being as yet unknown, recovery seems to be impossible, as witness the history of the passenger pigeon and the Eskimo curlew.

So far as known, the last Labrador duck seen alive by man was taken at Grand Menan on the Maine coast in 1871. Fortunately, some forty-odd specimens are known to be in museums and in private collections.

PACIFIC EIDER (Somateria dresseri).

Range: Breeds from southern Ungava and Newfoundland to southeastern Maine, and on southern half of Hudson Bay; winters from Newfoundland and Gulf of St. Lawrence south on Atlantic coast regularly to Massachusetts.

The American eider is the eider of northeastern North America, and differs only slightly from its European representative, the "northern eider," from which is derived much of the eiderdown of commerce. The female anticipates the needs of her ducklings for a warm and soft bed by lining the nest with down plucked from her own breast. But this downy lining is coveted by the Icelanders, who regard the summer's crop of down as a substantial addition to their annual harvest and who accordingly appropriate it. The male, equally solicitous for the welfare of the nestlings, in turn denudes his breast of its down and replaces the lining. This also is taken, after which the pair are allowed to rear their brood in peace. Needless to say, the eider is carefully protected in Iceland, and hence the crop of down is a perennial one. This duck was formerly abundant and indeed nested along the coast from Maine northward. Eiders are much less numerous than formerly within our territory, for the sufficient reason that they have been ruthlessly killed. No doubt they would soon be extinct were it not for the fact that they breed in the north far from harm. The eider is a true marine duck and well deserves the title of "sea duck" bestowed upon it by gunners. So hardy are these birds that they choose to keep to the open sea during the severest storms, and rely for their preservation on their unsurpassed powers of swimming and diving. Eiders live largely upon mussels, which they secure in fifty feet or more of water. Dependent in no wise upon man and doing him no harm, they ask only for the universal boon of life.

KING EIDER (Somateria spectabilis) (See page 127).

WHITE-WINGED SCOTER (Oidemia deglandi).

Range: Breeds from the coast of northeastern Siberia, northern Alaska, northern Mackenzie, and northern Ungava south to central British Columbia, Alberta, northern North Dakota, and southern Quebec; winters on the Asiatic coast to Bering Island, Japan, and China, and in North America from Unalaska Island to San Quintin Bay, Lower California, the Great Lakes, and the Atlantic coast from the Gulf of St. Lawrence south (rarely) to Florida; non-breeding birds occur in summer as far south as Rhode Island and Monterey, California.

The general habits of this scoter correspond closely with those of its relatives. It winters in great numbers in company with other coots on the coasts of the New England and Middle States, and also along our west coast, especially in Oregon and Washington. Scoters are denizens of the sea and are almost as much at home there as the fish, crustaceans, and shell fish upon which they feed. So large are some of the shell fish that have been found in their stomachs that it is difficult to understand how the birds manage to swallow them, and equally difficult to comprehend how they can digest the hard, thick, calcareous shell. This they do, however, with ease and celerity, and the digestive feat is one an ostrich might well be proud of.

SURF SCOTER (Oidemia perspicillata) (See page 146).

AMERICAN SCOTER (Oidemia americana) (See page 146).



Female Male

STELLER'S EIDER SPECTACLED EIDER



Male Female Female Male

PACIFIC EIDER KING EIDER



Male Female

LABRADOR DUCK



Female Male Female Male Male Female

WHITE-WINGED SCOTER SURF SCOTER AMERICAN SCOTER

RUDDY DUCK (Erismatura jamaicensis).

Range: Breeds from central British Columbia, Great Slave Lake, southern Keewatin, and northern Ungava south to northern Lower California, central Arizona, northern New Mexico, northwestern Nebraska, southern Minnesota, southern Michigan, southern Ontario, and Maine; winters from southern British Columbia, Arizona, New Mexico, southern Illinois, Maine and Pennsylvania, south to the Lesser Antilles and Costa Rica.

The ruddy duck, or "dumb bird," as it is called in New England, alias the rook of the Potomac region, has a wide range in the United States from seacoast to seacoast, and formerly nested over much of this wide territory. That it is not unknown to sportsmen and others is attested by the fact that Trumbull in his "Names and Portraits of Birds" gives sixty-seven synonyms under which it appears. Some of these, as "deaf duck," "fool duck," "dumb bird," are indicative of its disposition; while others like "bull neck," "spine-tail duck," mark certain physical peculiarities. In appearance it is quite unlike any other duck, and when swimming, its plump, round body and uplifted tail serve to distinguish it to the merest tyro. It is extremely sociable and unites in large flocks, sometimes in company with other species. Over most of its range the little ruddy duck was formerly lightly esteemed for food, and consequently enjoyed comparative immunity from the pursuit of sportsmen and even from market gunners. As other more highly prized species diminished in numbers, the ruddy attracted more attention, and in waters like the Potomac River, where the rookies formerly gathered in fall by thousands, only a beggary remnant remains. Ruddies are the more easily killed because they do not readily take wing, but being expert divers endeavor, when pursued, to escape by diving. The gunner aware of this weakness has only to persist in pursuit of the birds, one after another, to secure most or all of a flock.

FULVOUS TREE-DUCK (Dendrocygna bicolor).

Range: Breeds from central California, middle-western Nevada, southern Arizona, and central Texas south to the Valley of Mexico and Michoacan; winters from central California and central Texas to southern Mexico.

The tree-ducks are tropical species, two of which, the black-bellied and the fulvous tree-duck, extend their range into the United States. In this country at least there is little to warrant the name of tree-duck, as the bird is no more arboreal, if as much so, than the wood-duck. No doubt it alights in trees in wooded districts, and very probably it occasionally nests in hollow trees, as do several others of our ducks; more often, however, it nests on the ground for the sufficient reason that much of the territory it inhabits is practically treeless. The only place in which I ever saw this species was Washoe Lake, Nevada, and there its habits are so similar to other ducks that frequent shallow lakes that at first I hardly recognized it. It is much more numerous in southern California than in Nevada, but migrates farther south in winter. This duck is credited with laying an unusually large clutch of eggs, from fifteen to thirty, but very probably the larger number is the result of two or more females laying in the same nest on a cooperative basis.

WOOD DUCK (Aix sponsa).

Range: Breeds from southern British Columbia, central Saskatchewan, northern Ontario, New Brunswick, and Nova Scotia south to central California, southern Texas, Florida, and Cuba; winters chiefly in the United States from southern British Columbia, Kansas, Illinois, Indiana, Pennsylvania, and New Jersey south to southern California and the Gulf of Mexico.

However divided the sportsmen of America may be on the many questions affecting their rights and privileges, they should one and all unite in an attempt to preserve the existence of the wood duck, perhaps the most beautiful of the duck tribe. It is true that in some sections of the country the wood duck is still far from uncommon, but no one conversant with the present state of affairs can examine the records of its former range and abundance without being convinced that the danger threatening the species is real and imminent; nor need recorded evidence alone be relied upon, for there are many sportsmen alive to-day whose memories go back to the time when this beautiful bird abounded in most of the wooded sections of eastern United States, where to-day few, if any, remain. A regulation under the Federal migratory bird law provides a closed season for the wood duck until 1918, and if this prohibition is faithfully observed, there is every reason to believe that the species will materially increase, more particularly as in States where it is wholly protected, or protected in spring, an increase in numbers has already been noted. It will be to our everlasting shame if this, one of the most perfect of Nature's creations, is allowed to meet the same fate as the passenger pigeon. Practically all the wood ducks nest and winter within our own boundaries and it is for us to say what shall be their fate.

WHITE-FRONTED GOOSE (Anser albifrons gambeli).

Range: Breeds on and near the Arctic coast from northeastern Siberia east to northeastern Mackenzie and south to lower Yukon Valley; winters from southern British Columbia to southern Lower California and Jalisco.

Though occasionally met with on the Atlantic coast and not uncommon in the Mississippi Valley, the white-fronted goose is essentially a bird of the far West, and is particularly abundant in the Pacific Coast States. This is one of the geese which used to visit the wheat fields of California in such numbers as to threaten the crop, and which men were hired to kill and frighten away. The hordes of former days are now represented by comparatively small numbers, and as the flesh is toothsome the problem of the near future is not how to destroy the birds most cheaply but what methods to employ to preserve them. White-fronted geese were found by Nelson breeding abundantly in the Yukon delta from the last of May till well into June. Their nests are placed on the grassy borders of lakelets, whence the young can be quickly led into the protecting water. In far-off Alaska this and the numerous other species of waterfowl that summer there in multitudes not only find comparatively safe solitudes in which to nest but, what is equally or more important, abundant food for themselves and their young. When they arrive in Alaska, late in April or early in May, according to the season, they find the previous year's crop of heath berries awaiting them in cold storage. Again in August and September the new crop of berries is ripe, and upon this the geese fatten and prepare themselves for the trip southward. Thus Alaska, the acquisition of which from Russia has more than fulfilled our expectations in many ways, proves to be the mecca of our waterfowl which, resorting there in spring by thousands, return in fall in fourfold numbers.



Male Female

RUDDY DUCK



FULVOUS TREE DUCK



Male Female

WOOD DUCK



WHITE-FRONTED GOOSE

BLUE GOOSE (Chen cærulescens).

Range: Breeds probably in interior of northern Ungava; winters from Nebraska and southern Illinois south to coasts of Texas and Louisiana.

We know comparatively little of the life history of the blue goose. That it breeds in the far North is certain and it is surmised that it nests in the interior of Ungava. Few ornithologists have ever seen the bird, even in migration, though it is known to pass down the Mississippi Valley in considerable numbers. If, as is said, this goose migrates by night as well as by day, one reason for its apparent scarcity is evident. A new chapter was added to the bird's history when, in 1910, McAtee and Job found it wintering by thousands in the delta of the Mississippi River. These observers report that the geese were in such numbers as to inflict great damage on pasture lands. Like all its relatives, this species is a strict vegetarian and is particularly fond of the tender shoots of grass or grain. Eaton, in his "Birds of New York," after remarking that the blue goose is one of the rarest waterfowl which visits the waters of New York State, gives the following synonyms under which the bird is known locally: blue snow goose, blue-winged goose, blue wavy, white-headed blue brant, white-headed goose. The list would seem to indicate that at some time or other the goose was more widely distributed or better known than at present.

SNOW GOOSE (Chen hyperboreus hyperboreus) (See page 146).

BRANT (Branta bernicla glaucogastra).

Range: Breeds on the Arctic Islands north of latitude 74° and west to about longitude 100°, and on the whole west coast of Greenland; winters on the Atlantic coast from Massachusetts south to North Carolina.

The brant has a peculiar interest for eastern sportsmen since, while its nesting grounds are within the Arctic Circle, the bird winters on the Atlantic coast from New England south to North Carolina. Brant have always been favorite objects of pursuit by sportsmen, and many clubs have been formed the main object of which is brant shooting. Whatever be the cause, or the combination of causes, the brant is nowhere near as abundant as it was formerly, and while there would seem to be no danger of immediate extinction, a halt should be called on the indiscriminate destruction of the bird before it is too late. As pointed out by Forbush, while brant are well protected in summer by the remoteness and inaccessibility of their nesting grounds, the short Arctic season with the possibility of early storms exposes their young to great danger. One or more unfavorable breeding seasons in the Arctic, combined with the activity of sportsmen along the south Atlantic coast, might quickly jeopardize the safety of the species. The brant is not a diver and it procures its favorite food, eel-grass, when the tide is low, and when the rising water interferes with its activities it has to content itself with the floating fragments. Its apparent inability to dive for its food seems all the more remarkable since when wounded it not only can dive well but swim under water for a considerable distance. The flesh of the brant is usually excellent, although, as is the case with waterfowl generally, its flavor depends largely upon a variety of circumstances, especially upon the nature of its food for a few weeks prior to its being killed.

BLACK BRANT (Branta nigricans) (See page 146).

CANADA GOOSE (Branta canadensis canadensis).

Range: Breeds from the valley of lower Yukon, northwestern Mackenzie, and central Keewatin south to southern Oregon, northern Colorado, Nebraska, and Indiana; winters from southern British Columbia, southern Colorado, southern Wisconsin, southern Illinois, and New Jersey south to southern California, Texas, and Florida.

This, one of the largest of our waterfowl, is notable in many respects other than mere size. The wedge-shaped flocks of wild geese that, spring and fall, with melodious honking, wing their way respectively to their breeding and wintering grounds are a very familiar sight, and advertise in a most spectacular way that wonderful phenomenon—bird migration. The bird observer of speculative mind may find interest in answering the question—Why do geese usually fly in wedge formation? Is it because the powerful wings of the leader make easier the passage of those behind him or, as suggested by Forbush, does the wedge formation enable each individual member of the flock to see better?

Formerly the Canada goose, despite its name, nested in much of our territory and as far south at least as Massachusetts. To-day comparatively few geese nest within our borders, although flocks of goslings, convoyed by their parents, may still be seen on some of our western lakes. The "honker" is still far from extinct, and owes its present numbers both to the fact that it nests chiefly in the unfrequented territory of the far North, where its only enemies are the wild beast and the roving Indian, and to its wariness, the result of much and long-continued persecution.

CACKLING GOOSE (Branta canadensis minima) (See page 147).

EMPEROR GOOSE (Philacte canagica) (See page 147).

TRUMPETER SWAN (Olor buccinator).

Range: Breeds from the Rocky Mountains to the western shore of Hudson Bay and from the Arctic Ocean to about latitude 60°; winters from southern Indiana and southern Illinois south to Texas, and from southern British Columbia to southern California.

This swan, the largest of American waterfowl, though by no means an infrequent visitor to both coasts, is by preference a resident of the interior where formerly it was very numerous. It used to nest in our northern tier of States west of the Mississippi, and Cooke states that it nested in Iowa as late as 1871. Its former breeding resorts were and still are in the region west of Hudson Bay. The bird, however, has become extremely rare, and there is little doubt that the days of the species are numbered. Several causes have contributed to this end. Swans are not divers and have to procure their food, mainly aquatic roots and grasses, in shallow water, their long necks greatly aiding them to secure the coveted delicacies three feet or so under the surface. Thus, when feeding, they are greatly exposed to attack by hunters who can pot them almost at will. Then, too, in the days of Hudson's Bay Company, swans' skins formed a regular article of trade with the Indians, who killed large numbers also for the pot. These may be considered contributory causes, but it was the shotgun and rifle in the hands of our gunners that settled the fate of this superb species.

The whistling swan, a near relative of the trumpeter, and only a little smaller, has not suffered to the same extent, as it breeds farther north. Still it, too, has diminished greatly, and it must soon follow the fate of its larger relative.



BLUE GOOSE SNOW GOOSE



CANADA GOOSE CACKLING GOOSE



BRANT BLACK BRANT



EMPEROR GOOSE TRUMPETER SWAN

WHOOPING CRANE (Grus americana).

Range: Mainly restricted to southern Mackenzie and northern Saskatchewan; winters from the Gulf States to central Mexico.

If we go back about a century we find this, the largest of our cranes, abundant and nesting over a vast area stretching from the Mackenzie region to Iowa, a strip 1,500 miles long by less than 300 miles wide. Cooke states that eggs of this species were taken in Iowa as late as 1894, and at Yorkton, Saskatchewan, as late as May 16, 1900. In its day and generation the whooping crane, big and conspicuous as it is, was common enough, as is attested by numerous authorities. Thus, Nuttall, speaking of a night on the Mississippi in December, 1811, says, "the whole continent seemed as if giving up its quota of the species to swell the mighty host. The clangor of their numerous legions, passing along, high in air, seemed almost deafening." To-day what a contrast! The clangor of passing multitudes no longer fills the air, for this noble bird, whose number was legion a century ago, is now practically extinct in the Atlantic States, while only a few pairs manage to maintain themselves in far out-of-the-way places, and so to delay for a few years the final extinction of the species.

In early colonial times the whooping crane was taxed with pillaging corn fields, and doubtless suffered for its crimes. Moreover, its flesh was reputed to be excellent, and no doubt this fact contributed to its destruction. One of the regulations under the Federal law fixes a closed season till 1918 for our three species of cranes, whooping crane, sandhill crane, and little brown crane, but, so far as this species is concerned, the regulation probably comes too late.

KING RAIL (Rallus elegans).

Range: Breeds from Nebraska, southern Minnesota, Ontario, New York, and Connecticut south to Texas, Florida, and Cuba; winters mainly in the southern part of its breeding range.

The king rail, the largest and handsomest of its family, is trim of form, moves with an air of conscious grace, and is tastefully garbed in soft brown and black, which harmonize wonderfully well with the vegetation of swamp and meadow, among which it passes its life. Moreover, it possesses in the highest degree that form of beauty which consists in the perfect adaptation of means to end, for its entire make-up is wonderfully in keeping with its mode of life. Anyone familiar with the appearance of the Virginia rail will recognize the king rail on sight since it is a near counterpart of that bird, except in size. It lives exclusively in fresh-water meadows where it hides in the thick cover after the manner of its kind. So adept is it at the game of hide-and-seek that, though you may mark one down to a foot, it is rarely that either man or dog can put it up a second time, though the cover may appear to be insufficient to conceal even a sparrow. When on the wing the bird appears to fly with great effort. As a matter of fact, it can fly well enough for all practical purposes, but it has a pair of stout legs quite capable of taking their owner out of harm's way under ordinary circumstances, and it usually prefers to entrust its safety to these members rather than to its wings. Apparently the rail is nowhere very numerous, but it is difficult to say how far this seeming scarcity of the bird is due to its secretive habits. As it is prolific, laying from seven to twelve eggs, and offering no great temptation either to the sportsman as a mark or to the gunner as a market bird, this handsome rail should long continue a denizen of our fresh-water marshes.

SANDHILL CRANE (Grus mexicana).

Range: Resident in Louisiana and Florida; bred formerly from southern British Columbia, Saskatchewan, Manitoba, and western Ontario south to California, Colorado, Nebraska, Illinois, and Ohio; winters from California, Texas, and Louisiana south to Mexico.

The big sandhill crane seems most at home on the broad expanse of the western prairies and marshes, which offer it food and security. It is still common, however, in Louisiana and southeastern Florida, where the prairies and savannas are large enough to suit its tastes. Thus, as pointed out by Cooke, the two breeding areas of this species are separated by a distance of more than 600 miles. As the crane struts majestically about, it keeps a watchful eye for enemies, and when the danger proves threatening, it spreads its broad wings and with measured beats flies slowly away. Its loud buglelike notes, when heard coming from mid-air, as the birds slowly pass out of sight, have a delightful musical quality. The food of this crane consists of a large variety of animal life, among which are grasshoppers and meadow mice, so that a distinct claim of economic usefulness may be made for it. Unfortunately for its safety its meat is by no means unpalatable and in some localities it is much sought after for food. Unquestionably, however, the restriction of its breeding and feeding grounds by settlement has had more to do with the decrease in its numbers than firearms. Probably the fate of such a large bird, requiring so much space and freedom, can not be averted, but it can at least be postponed, and every man who carries a gun should do his part by refraining from making a target of its big body.

Of the three species of cranes living in the United States the brown crane is the smaller and is confined to the Middle West.

CLAPPER RAIL (Rallus crepitans crepitans).

Range: Breeds from Connecticut to North Carolina; winters mainly south of New Jersey.

The distribution of the clapper rail complements that of the king rail, for the clapper inhabits the salt-water marshes as its relative does the fresh-water meadows. Though occasional as far north as Massachusetts, the clapper rail does not begin to be numerous until Long Island is reached. Farther south it inhabits the salt marshes in great numbers. It used to nest abundantly on Cobb's Island and other sandy islands along the Atlantic coast which are fringed on the landward side by dense beds of rushes. When on Cobb's Island, I once offered a small boy a quarter apiece for some of the young clappers, as I had never seen them. In about an hour he returned and to my astonishment turned out of his cap more than a dozen of the quaint, black, fluffy youngsters, some of which apparently had just chipped the shell. It appeared that an uncommonly high tide had driven the birds from their usual haunts, and the nestlings were to be had by the dozen by wading through the reeds and picking them off the piles of floating debris. I had the pleasure of returning most of them to their native haunts, and the rapidity with which they lost themselves among the reeds showed that they needed no parental lectures on the art of concealment.

A closely allied species, the California clapper rail, represents the eastern bird on the Pacific coast of Oregon and California. As the name implies, clapper rails are noisy birds, and their harsh notes are often heard coming from the thick reeds when the callers are invisible. They lay from seven to a dozen eggs and are so prolific that with a decent regard for seasons and bag limits, they should hold their own to the end of time.



Young Adult

WHOOPING CRANE



Adult Young

SANDHILL CRANE



KING RAIL



CLAPPER RAIL

SORA (Porzana carolina).

Range: Breeds from central British Columbia, southern Mackenzie, central Keewatin, and Gulf of St. Lawrence south to southern California, Colorado, Kansas, Illinois, and New Jersey; winters from northern California, Illinois, and South Carolina through the West Indies and Central America to Venezuela and Peru.

Though distributed generally throughout the United States and breeding in fresh-water meadows almost everywhere, the sora is far more abundant east of the Mississippi than west of it. However abundant it may be, its chosen haunts of swamp and meadow are so rarely visited and the bird is of such secretive habits that it may abound in a given neighborhood and few be aware of the fact. Towards the nesting season the sora becomes garrulous, and its low, whistled notes form a pleasant addition to the early summer chorus that comes from the reedy recesses. Even in fall one has only to make an unusual noise near a sora swamp, as a sharp tap of the paddle on the boat, to elicit a chorus of protesting "kuks," which announce the presence of hundreds of the rails. But it is as a tidbit for the table and as a game bird that the sora is best known in the Atlantic States, where sora shooting is looked forward to as an annual experience not to be lightly foregone. Wherever wild rice abounds there the rails congregate by thousands to feed on the ripening grain. At high tide the gunner in a light skiff is poled among the reeds, and as the birds rise, sometimes a dozen at a time, they form easy marks. Every fall many thousands of the rails are killed and, although the birds lay from eight to fifteen eggs, soras are steadily decreasing.

PURPLE GALLINULE (Ionornis martinicus).

Range: Breeds from Texas, Tennessee, and South Carolina south through Mexico and the West Indies to Ecuador and Paraguay; winters from Texas, Louisiana, and Florida southward.

The bright colors of the purple gallinule suggest a tropical origin, and the bird in fact is far more at home in tropical lands than in temperate climes. It not only runs nimbly and with grace over the leaves and stems of floating aquatic vegetation, but swims and dives well, and when suspecting danger progresses under water with only the bill visible. The general habits of the two gallinules are very similar.

FLORIDA GALLINULE (Gallinula galeata).

Range: Breeds from central California, Arizona, Nebraska, Minnesota, Ontario, New York, and Vermont south through the West Indies and Mexico to Chile and Argentina, and in the Galapagos and Bermuda; winters from southern California, Arizona, Texas, and Georgia southward.

Although in no proper sense of the word a game bird, the Florida gallinule looks so much like a rail or a coot, and moreover so commonly frequents the same general localities as these birds, that it is frequently mistaken by the gunner and shot. Although it inhabits the Florida swamps, it is by no means restricted to that State, but possesses a wide range westward to the Pacific, northward as far as Massachusetts, and south well into the tropics.

The gallinule's habits are a combination of duck, coot, and rail, and the bird is most at home amid the tangle of vegetation that grows on the borders of fresh-water ponds, where it is careful to keep well concealed during the hours of daylight. After dusk gallinules feel safe in the open, and then may often be seen swimming across broad stretches of open water. The gallinule has little to commend it for the table, and as it is absolutely harmless, sportsmen will do well to acquaint themselves sufficiently with its appearance to avoid shooting it by mistake.

VIRGINIA RAIL (Rallus virginianus).

Range: Breeds from British Columbia, southern Saskatchewan, southern Keewatin, Ontario, southern Quebec, and New Brunswick south to southern California, Utah, Kansas, Missouri, Illinois, New Jersey, and eastern North Carolina; winters from Oregon, Utah, and Colorado to Lower California and Guatemala; also in the Lower Mississippi States, and from North Carolina to Florida.

The Virginia rail is a denizen of both fresh- and brackish-water marshes, though with a decided preference for the former, especially in the nesting season. Its thin, wedge-shaped body eminently adapts it for a life among sedge and tule, through the stems of which it glides so swiftly and noiselessly that the sharpest-eyed observer rarely catches a glimpse of it. Where notified of its presence by its grunting notes, which Brewster aptly compares to the sounds of a hungry pig, one has only to sit down in a favorable spot and patiently await the time when our brown Knight of the Reeds steps daintily forth into the open in search of food and sunlight. He is never quite at home, however, outside the friendly shelter of reeds and grasses, and in the open ever betrays by his alert actions the consciousness of possible danger. The slow, wavering flight of this rail appears to betray the novice. Nevertheless, these same wings that seem to be overtaxed in a flight of fifty yards or so are capable of carrying their owner over long distances in migration. Cooke thinks that many soras cross the Gulf of Mexico in their passage to South America, and the Virginia rail is probably capable of an equally protracted flight. The distance in fact between its extreme habitat, southern Canada and Guatemala, is approximately 2,100 miles. All rails migrate by night and as a rule fly low, as though conscious of their inferior wing powers.

COOT (Fulica americana).

Range: Breeds from central British Columbia, southern Mackenzie, Manitoba, Quebec, and New Brunswick south to northern Lower California, Texas, Tennessee, and New Jersey; also in southern Mexico, southern West Indies, and Guatemala; winters from southern British Columbia, Nevada, Utah, the Ohio Valley, and Virginia south to Colombia.

Though neither a rail nor a gallinule, "Blue Peter" belongs to the same family as these birds, and if habits and appearance are taken into account, may be considered a sort of connecting link between the rails and the ducks. His waxy, white bill, and his lobed feet may be depended upon to distinguish him from the rest of the rail family and also from all other birds. He swims well and also is a good diver, though he never essays great depths. Coots are extremely sociable, even in the nesting season, and where one pair is, more may be expected. Their nests are bulky structures of reeds and grasses floating on the water, and are kept from drifting away only by the rushes among which they are built, and which serve both to anchor and to conceal them. Fortunately for themselves, coots are little esteemed for food and, indeed, in most parts of the United States are contemptuously ignored by sportsmen. As a consequence, "Blue Peter" still flourishes in the rivers and ponds of some sections of the United States, although in reduced numbers.

This was one of the few waterfowl to discover the Hawaiian Islands, that little archipelago in mid-ocean, 2,000 miles from Alaska, whence the birds originally came. So well satisfied were the early explorers with their new discovery that they founded a permanent colony in Hawaii, and still exist in considerable numbers, having changed very little in appearance and not at all in habits.



Adult Young

SORA



VIRGINIA RAIL



PURPLE GALLINULE FLORIDA GALLINULE



COOT

HOODED MERGANSER (Lophodytes cucullatus) (See page 109).

Range: Breeds from central British Columbia, Great Slave Lake, central Keewatin, central Ungava, and Newfoundland south to southern Oregon, northern New Mexico, southern Louisiana, and central Florida; winters from southern British Columbia, Utah, Colorado, Nebraska, Illinois, Indiana, Pennsylvania, and Massachusetts south to Lower California, Mexico, and the Gulf States.

This, the smallest and most beautiful of the mergansers, ranges from Alaska to Mexico, and formerly was abundant in the East where it nested in many States, including New England. Of late years it has diminished greatly in numbers, as would be expected of a bird of its habits. Unlike its near relatives, it prefers still-water ponds and rivers, and is often found in company with the wood duck. Its flesh is said to have little of the unpalatable fishy flavor of its congeners, and this would seem to imply a more varied diet, including probably seeds and grasses. Nevertheless, nature did not endow the merganser with the serrated bill of its kind without a purpose, and its skill in diving and seizing its finny quarry proves that fish, or at least aquatic creatures of some sort, are its natural food. The hooded merganser nests in hollow trees, sometimes thirty or more feet up, and the wonder is how the tiny ducklings find their way to the nearest water as they certainly do in a very few hours after emerging from the egg. Sometimes the mother may act as a common carrier for her brood, and again, when the height is not too great, the ducklings may drop to the ground or water as the case may be.

SHOVELLER (Spatula clypeata) (See page 111).

Range: Breeds from northwestern Alaska, northwestern Mackenzie, and southern Keewatin south to southern California, central New Mexico, northern Texas, northern Missouri, and northern Indiana; winters from southern British Columbia, Arizona, New Mexico, southern Missouri, southern Illinois, Maryland, and Delaware south to the West Indies and Colombia.

The shoveler is cosmopolitan in its range and, while no longer common in the Eastern States, it is still numerous in several States of the far West where it breeds. The shoveler likes reedy ponds and sloughs, where it grubs in the shallows, and obtains a rich feast of insects, tadpoles, worms, and larvæ of various kinds, which its shovel-shaped bill seems expressly designed to enable it to scoop up and strain out of the reedy ooze. By many it is accounted one of our best table-ducks. And as it is not shy and is often killed in large numbers, it has suffered a notable decrease in numbers. The shoveler is a swift flier and is capable of enduring flight, as is apparent from the fact that annually it finds its way from Alaska over the 2,000 miles of intervening ocean to the Hawaiian Islands. There it winters, and the few that escape the ardent pursuit of the island sportsmen retrace their way across the tractless ocean in spring for the purpose of nesting.

GADWALL (Chaulelasmus streperus) (See page 111).

Range: Breeds from southern British Columbia, central Alberta, and central Keewatin south to southern California, southern Colorado, northern Nebraska, and southern Wisconsin; winters from southern British Columbia, Arizona, Arkansas, southern Illinois, and North Carolina south to southern Lower California, central Mexico (Jalisco), and Florida.

Though seemingly as well fitted for the struggle for existence as any of its fellows, the gadwall apparently was never very abundant in any part of its range. Formerly it was not uncommon in New England and in the Middle and Eastern States, but for a quarter of a century or more the bird has been practically unknown to the sportsmen of the Atlantic seacoast, though still found in considerable numbers in Texas, and other Western States. I have never seen the gadwall in large flocks, but usually singly or by twos or threes in company with ducks of other species, and such seems to have been the experience of many other observers. It is a denizen of fresh water and is fond of shallow lakes and ponds, where its habits somewhat resemble those of the mallard. It is a good diver when the need arises, but usually finds little occasion for the exercise of its skill, since it frequents the shallow margins of ponds and lakes in company with mallards and other species. I have frequently seen the gadwall literally stand on its head in shallow water grubbing for food on the muddy bottom, when only its feet and the tip of its tail were sticking out. Its bill of fare is varied and includes aquatic grasses, seeds, nuts, insects, mollusks, in short almost any edible substance it can obtain.

CINNAMON TEAL (Querquedula cyanoptera) (See page 111).

Range: Breeds from southern British Columbia, southwestern Alberta, southeastern Wyoming, and western Kansas south to northern Lower California, northern Chihuahua, southern New Mexico, and southwestern Texas; winters from southern California, central New Mexico, and southern Texas south to southern Lower California and central Mexico.

Though a stray individual the cinnamon teal is occasionally seen east of the Mississippi, and though the bird is known to breed as far east as western Kansas, the true home and center of abundance of this species is west of the Rocky Mountains. Its favorite resorts in summer are the extensive marshes that surround shallow fresh or alkali lakes. Well within the recesses of these, it selects a dry spot and on it builds its nest. When the young are hatched they are led by the anxious mother to the shelter of the tall tules that surround these inland lakes by a broad strip of dark green, and here they are safe, at least from most four-footed enemies. Though the cinnamon teal summers to some extent in British Columbia, and a greater or lesser number winter south of our borders, as a species the teal may be said to pass its life within our boundaries. At present it does not receive adequate protection at any season of the year, and in many places large numbers are killed before they can fly. If thoroughly protected during the summer and if reasonably protected at other seasons, the teal will hold its own indefinitely, or until, in the interests of agriculture, all its marshy fastnesses have been turned into ploughed fields which, fortunately for waterfowl and bird lovers, will not be for many years to come.

LESSER SCAUP DUCK (Marila affinis) (See page 113).

Range: Breeds from Yukon Valley, Alaska, and Fort Anderson, Mackenzie, south to central British Columbia, southern Montana, Colorado (casually), northern Iowa, northern Indiana, and western Lake Erie; winters from southern British Columbia, Nevada, Colorado, Lake Erie, and New Jersey south to the Bahamas, Lesser Antilles, and Panama.

So closely do the two scaups or blue-bills resemble each other and so similar are their general habits that, except as regards their distribution, what is said of one applies almost equally well to the other. Like its congener, the lesser scaup is prone to associate in immense flocks, and on this account is sometimes called the "raft duck." Because of this habit and because it decoys well, this scaup is a favorite with gunners, and immense numbers are killed every season and find their way to the markets. Naturally they are nothing like so numerous as formerly though, everything considered, they still hold their own fairly well. I found the lesser scaup abundant in Florida and in the Gulf States in winter in the early seasons, and Chapman thinks they are more southern in their winter distribution than is the greater scaup. This species ranks among our best divers and its food habits are such as to insure it a warm welcome on the table of the epicure. It is very fond of wild rice, and in fall, when the crop of this grain ripens, frequents the inland lakes by thousands, and soon becomes fat on this nutritious diet. In protected waters it it surprising how soon this duck and its congener, the greater scaup, become tame. I have often approached flocks within half a gun shot that were apparently quite indifferent to my presence, and yet elsewhere the same individuals were wary enough to insure their own safety. No doubt the scaups would readily lend themselves to semi-domestication.

RING-NECKED DUCK (Marila collaris) (See page 113).

Range: Breeds from southern British Columbia to northern California, and from northern Alberta and Lake Winnipeg south to North Dakota, northern Iowa, and southern Wisconsin; winters from southern British Columbia, New Mexico, northern Texas, southern Illinois, and New Jersey south to Porto Rico and Guatemala.

So much alike are the ring-neck and the lesser scaup in size, flight, and general appearance that it is only when the sportsman has bagged his bird that he can fully assure himself of its identity. Without doubt the ring-neck is much more uncommon in the Atlantic States than formerly, though Chapman states that in winter it is still abundant on the Florida fresh-water lakes. It is fairly numerous in migration in the far West in the marshes of large ponds and lakes, and still continues to breed in considerable numbers in Minnesota and North Dakota and perhaps elsewhere in our northern frontier States. I have never seen the ring-neck in large flocks, so characteristic of the scaups, and usually have observed it either in small companies consisting exclusively of its own species, or associated in large flocks of other species, and such, I believe, has been the experience of most other observers. The ring-neck has no fondness for salt water, but is preeminently a fresh-water species. Like other members of the genus it is an excellent diver, and where wild celery is to be had, gets its share of the coveted grass. In point of excellence for the table it may be ranked with the two scaups, but does not equal the redhead or canvas-back.

SPECTACLED EIDER (Arctonetta fischeri) (See page 117).

Range: Breeds in Alaska from Point Barrow to mouth of Kuskokwim, and on the northern coast of Siberia west to mouth of Lena River; winters on Aleutian Islands.

Nelson's observations show this species to be strictly limited to the salt marshes bordering the east coast of Bering Sea, and thus favoring the shallow, muddy, coast waters, which appear so distasteful to Stellar's eider. The same observer estimates that, all told, the spectacled eider does not occupy over 400 miles of coast line in the breeding season, while the width of the breeding ground will not exceed one or two miles. Writing as long ago as 1881, Nelson said of the struggle for existence the species was even then undergoing: "The species has to contend against thousands of shotguns in the hands of the natives. The diminution in all the species of waterfowl breeding along the coast is more and more marked each season, and while this may mean a desertion of one region for another in the case of the great majority of geese and ducks, yet for such narrowly-limited species as the spectacled eider, and to a less extent the emperor goose, this diminution is but the beginning of extermination; moreover, the present scarcity of large game along the coast is having great effect in causing the natives to wage a continually increasing warfare upon the feathered game."

KING EIDER (Somateria spectabilis) (See page 117).

Range: Breeds along coast of northern Siberia and Arctic coast of America from Icy Cape east to Melville Island, Wellington Channel, northern Greenland, northwestern Hudson Bay, and northern Ungava; winters on Pacific coast from Aleutian Islands to Kodiak Island, in the interior rarely to the Great Lakes, and from southern Greenland and Gulf of St. Lawrence south regularly to Long Island.

The king eider is a resident of Arctic realms, and visits the Great Lakes and our North Atlantic coast only in winter. At Point Barrow, on the Arctic coast, Murdock found this the most abundant bird, but even there it occurred chiefly as a migrant. The king eider is almost as much at home in the water as a fish, and is able to keep to the open sea during the severest winter weather. In fact, probably the bulk of the species never migrate at all, or only move south a sufficient distance to reach permanent open water. The bird feeds largely upon mussels, and as the beds are in deep water all its natatorial powers are brought into play in diving for its daily fare. It has actually been taken in the gill nets of fishermen in more than 150 feet of water, as Eaton states, a fact which sufficiently attests its skill and hardihood, more particularly as the water at this season is icy cold.

Like its relatives, it nests among rocks and bushes. The eiders are not so prolific as many of our smaller ducks, and this one commonly lays only five or six eggs. The king eider is one of the species the Icelanders depend on to furnish the harvest of down which is one of the important crops gathered by these northern people. The Icelanders are not the only ones who are dependent on this and other eiders for the necessities of life, for as Nelson tells us "the skins of all the eiders, but especially of this species and the Pacific eider, are used in making clothing by the Alaskan Eskimo, and the skin of the female, split down the back, with head, legs, and wings removed, is a very common article of foot-wear. It is used inside of the sealskin boots, and is very comfortable in winter."



BLACK-NECKED STILT AVOCET



WOODCOCK



WILSON'S SNIPE



Summer and Winter Plumage
DOWITCHER

Summer and Winter Plumage
KNOT

BLACK-NECKED STILT (Himantopus mexicanus).

Range: Breeds from central Oregon, northern Utah, and southern Colorado to southern California, southern New Mexico, southern Texas, coast of Louisiana, and in Mexico, and from central Florida and Bahamas throughout the West Indies to northern Brazil and Peru; winters from southern Lower California, southern Texas, southern Louisiana, and southern Florida south through Central America and the West Indies to northern Brazil, Peru, and the Galapagos.

So commonly associated are the stilt and avocet and so similar are the general habits of these two very dissimilar species that the same account applies almost equally well to both. Like the "blue stockings," the stilt used to be rather common in the Atlantic States, but it has suffered at the hands of gunners till few of the present generation know the bird by sight. In 1871 I saw a lone stilt in Florida at the head of the Miami River, where it debouches from the Everglades—my sole experience with the species east of the Mississippi. But in the far western States I have seen many hundreds leading their natural lives by lakeside or slough in company with avocets. Even the most unobservant could not compare the general structure of these two species and not draw the inference that their habits must be very similar. The long bill of the stilt, indeed, is straight instead of being curved, but otherwise the stilt is as well equipped as the avocet to wade in shallow waters and extract a living beneath the muddy surface. It is true that its toes are not webbed, but our stilt seems not to have discovered its deficiency in this respect, and, when deep water intervenes, launches in with confidence born of long experience.

AVOCET (Recurvirostra americana) (See page 147).

WILSON'S SNIPE (Gallinago delicata).

Range: Breeds from northwestern Alaska, northern Mackenzie, central Keewatin, and northern Ungava south to northern California, southern Colorado, northern Iowa, northern Illinois, Pennsylvania, and New Jersey; winters from northern California, New Mexico, Arkansas, and North Carolina to Colombia and southern Brazil.

Wilson's or the English snipe is a bird of fresh-water swamp and meadow, in which it finds concealment among the grass or grassy tussocks. It is particularly fond of places where the soil is boggy enough to permit probing with its sensitive bill, for it finds much of its food beneath the surface in the shape of succulent worms. Owing to the nature of its haunts and its secretive habits, the snipe is familiar to but few outside the guild of sportsmen. Even nature lovers know the bird chiefly by its sharp "scaip, scaip," as it flushes suddenly from among the grasses. So quickly does the snipe get under way that one is apt to catch only a glimpse of a brown and black body as it cuts the air on powerful wings with many a twist and turn. It is this peculiar flight that endears the snipe to the sportsman, since a steady hand and a quick eye are needed to stop the bird when bent on escaping from a dangerous neighborhood. Most States until recently have permitted spring snipe-shooting. The practice is held by many to be the more excusable inasmuch as some States get little or no snipe-shooting in fall, and to forego spring shooting means no snipe-shooting at all in such States. No one, however, who has marked the steady decline in the number of snipe that migrate across our territory can doubt that the continuance of spring shooting means the extinction of this highly-prized game bird.

WOODCOCK (Philohela minor).

Range: Breeds from northeastern North Dakota, southern Manitoba, northern Michigan, southern Quebec, and Nova Scotia south to southern Kansas, southern Louisiana, and northern Florida; winters from southern Missouri, Ohio Valley, and New Jersey south to Texas and southern Florida.

The woodcock, another member of the royal family among game birds, is practically the exclusive property of the American people to deal with as they list. It is true that a greater or lesser number of woodcock cross our northern frontier to breed, but the bulk of the species never leave our own borders. As a prerequisite to its presence the woodcock requires soft, moist earth in which to probe for earthworms, and its range may be said to be largely determined by the presence or absence of its favorite food. Study him at what season you will, meet him where you may, the woodcock is always an interesting bird. His spring-flight song, given as the hours of darkness approach—for the woodcock is chiefly of nocturnal habits—is unique among the long-billed, long-legged fraternity, and the many details connected with his housekeeping are well worth attention. And what music so sweet to the sportsman's ears as the silvery whistle of the woodcock's wings when the bird, suddenly roused from his snug shelter beneath bush or bracken, mounts upward through the silver birches! Nor is any other prize among game birds so dear to the sportsman's heart as this many-hued denizen of swamp and hillside when brought to bag in fair, sportsmanlike fashion. All the more keenly then must sportsman and bird lover regret the fact that the woodcock is passing. While there is no present danger of extinction, spring and summer woodcock-shooting should be abolished as a crime alike against a fine game bird and fair sportsmanship.

DOWITCHER (Macrorhamphus griseus griseus) (See page 147).

KNOT (Tringa canutus).

Range: Breeds from northern Ellesmere Land south to Melville Peninsula and Iceland; also on Taimyr Peninsula, Siberia; winters south to southern Patagonia, and from the Mediterranean to South Africa, India, Australia, and New Zealand.

The knot is cosmopolitan in range and occurs on every continent and on many islands, large and small. It is strong of wing, and when migrating appears not to regard distance, for it spans the territory that separates Grinnell Land and the Straits of Magellan. It is a characteristic bird of the sea beach, and its food is obtained by following the receding waves and seizing the minute crustaceans and mollusks momentarily uncovered by the surf. Apparently, the robin snipe never was so abundant on the Pacific coast as along the Atlantic, but the species promises to last longer on the Pacific because less persecuted there. Enormous bags were formerly made on the eastern coast, more particularly during the last of May and early June. Thus the birds were pursued not only in fall but till near the opening of the nesting season, a sufficient cause of their diminution. In further explanation of the present small numbers of the knot, however, the fact counts for much that until recently there have been practically no bag limits for our shorebirds, and many gunners have shot as long as the birds and their ammunition lasted. All shorebirds that associate in large flocks are unsuspicious, as though safety lay in numbers. When the sportsman is to be reckoned with the reverse is true. Easily decoyed by wooden stools, or by the whistled imitation of their own note, or that of the black-bellied plover, a flock of robin snipe will swing in to within gunshot, and repeat the dangerous experiment two or three times, or until the flock is reduced to a few survivors.



SPOTTED SANDPIPER



PECTORAL SANDPIPER



Summer and Winter Plumage
SANDERLING



UPLAND PLOVER

SPOTTED SANDPIPER (Actitis macularia).

Range: Breeds from tree limit in northwestern Alaska, northern Mackenzie, central Keewatin, northern Ungava, and Newfoundland south to southern California, Arizona, southern Texas, southern Louisiana, and northern South Carolina; winters from California, Louisiana, and South Carolina to southern Brazil and central Peru.

This ubiquitous little sandpiper is probably better known to the residents of the United States than any other of its kind. From Alaska to Florida it may be looked for with confidence along the seashore or wherever river, pond, or slough offers it food and congenial surroundings. The sound of its sweet "weet weet" often announces its presence in the most unexpected places. As if its ordinary every-day activities were not sufficient for its energetic little body, it incessantly bows its head and teeters its tail, and so honestly comes by its vernacular name of "tip up" or "teeter." Unlike most of its kin this sandpiper never assembles in flocks, and hence offers no especial temptation to the gunner who, if he pursues it at all, must content himself with securing one tiny body at a shot; and although in fall our sandpiper becomes a perfect ball of fat, few consider the game worth the candle. Such being the case, we may expect to see this small wader survive many larger members of its tribe which, less fortunate than it, have a market value. The spotted sandpiper includes in its diet many insects that are harmful.

SANDERLING (Calidris leucophæa).

Range: Breeds from Melville Island, Ellesmere Land, and northern Greenland to Point Barrow, Alaska, northern Mackenzie, Iceland, and in northern Siberia; winters from central California, Texas, Virginia, and Bermuda to Patagonia.

The sanderling breeds on the far-away Arctic coast, and in early fall begins its wanderings southward. These take it pretty much over the known world. Even the Hawaiian Islands, in mid-ocean, more than 2,000 miles distant from the bird's nearest breeding grounds, are not too remote to attract it, though it is never numerous there. The sanderling is well named "beach bird," for sandy beaches are its favorite places of resort. No prettier sight can be imagined than a flock of these little white birds when busily engaged hunting for food. As the foam-topped breakers rush up the beach, and retreat to gather force for another dash, they plough up the sand, and expose for a few brief seconds multitudes of sand fleas and minute shell fish. These are the chosen food of the sanderlings, and to gather their harvest they keep pace with the progress of the waves, now advancing, now retreating, ever ready to snatch any hapless creature less nimble than they. Sanderlings fly in small companies, and often a few individuals mingle with flocks of larger species. Though naturally so tame and unsuspicious as hardly to recognize the presence of man, they associate in such small numbers that they are not greatly exposed to slaughter by the sportsman who, indeed, not long since, would have scorned such small game. But nowadays, when the larger shorebirds are scarce, the humble small fry must take their place and help fill the bag.

UPLAND PLOVER (Bartramia longicauda).

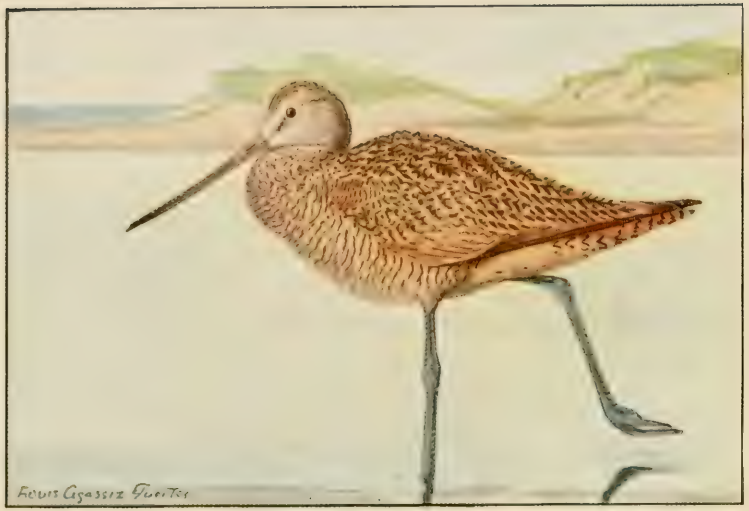
Range: Breeds from northwestern Alaska, southern Mackenzie, central Keewatin, central Wisconsin, southern Michigan, southern Ontario, and southern Maine to southern Oregon, northern Utah, central Oklahoma, southern Missouri, southern Indiana, and northern Virginia; winters on the pampas of South America to Argentina.

Though a member of the sandpiper family and in excellent standing, the upland plover has the habits and the melodious voice of both plover and curlew. It inhabits grassy prairies and pastures. Though sometimes found in companies of considerable size, the bird does not associate in compact flocks, as do many sandpipers, plovers, and curlews. Formerly it nested over much of the United States, though its center of abundance was always the Prairie States, where not many years ago it was found literally by thousands. By nature the upland plover is unsuspecting and, even after much persecution has taught it to be shy and wary of man, it may easily be approached on horseback or in a vehicle. Because of its approachability and its excellence for the table, the sportsman and the market gunner between them have practically exterminated the bird in much of its eastern territory, and it is no longer abundant anywhere. By the terms of the Federal law it is now unlawful to kill upland plover anywhere at any season, but it is to be feared that little attention is paid to the prohibition in the remote regions of the bird's habitat. The destruction of the species is the less excusable, as there are few of the family which are so valuable, whether viewed from the standpoint of the sportsman, the epicure, or the farmer. Every farmer should know that nearly half this plover's food consists of grasshoppers, crickets, weevils, and many other kinds of insects; while it behooves the cotton planter of Texas and other States to realize that among the insects the bird consumes is the cotton-boll weevil.

PECTORAL SANDPIPER (Pisobia maculata).

Range: Breeds on the Arctic coast from northern Alaska to mouth of Yukon and northeastern Mackenzie; winters in South America from Peru and Bolivia to northern Chile, Argentina, and central Patagonia.

The "grass bird," or "krieker," does not share the predilection of many of its relatives for the sea beach but prefers mud flats and marshes. In late fall the grass on the salt-water marshes is high enough to hide the krieker, and yet not offer resistance to its progress, and it is surprising how difficult it is to see one as it stands motionless watching the enemy with unalarmed eyes. This sandpiper arrives on the Bering Sea coast to breed in May, and Nelson's account of its song will surprise those who know the species only when migrating. Speaking of a night passed in the Yukon delta, he says: "As my eyelids began to droop and the scene to become indistinct, suddenly a low, hollow, booming note struck my ear. Again the sound arose nearer and more distinct, and with an effort I brought myself back to the reality of my position and, resting upon one elbow, listened. A few seconds passed and again arose the note; a moment later and, gun in hand, I stood outside the tent. The open flat extended away on all sides, with apparently not a living creature near. Once again the note was repeated close by, and a glance revealed its author. Standing in the thin grasses ten or fifteen yards from me, with its throat inflated until it was as large as the rest of the bird, was a male *A. maculata*. The note is deep, hollow, and resonant, but at the same time liquid and musical, and may be represented by a repetition of the syllables too-u, too-u, too-u, too-u, too-u, too-u, too-u."



MARBLED GODWIT



Summer Plumage Winter Plumage
HUDSONIAN GODWIT



Summer Plumage Winter Plumage
WILLET



LONG-BILLED CURLEW HUDSONIAN CURLEW ESKIMO CURLEW

MARBLED GODWIT (Limosa fedoa).

Range: Breeds from valley of Saskatchewan south to North Dakota; winters from southern Lower California, Louisiana, Florida, and Georgia to Guatemala and Belize.

The marbled godwit, one of the largest and finest of American shorebirds, formerly nested in Nebraska and Iowa. A few may still breed in North Dakota but the bulk of the species retire beyond our northern boundaries to rear their young. Though in summer an inhabitant of the interior prairies and marshes, the marbled godwit prefers to winter on the seacoast, and Cooke notes the remarkable fact that it "presents the unique spectacle of a bird breeding in the middle of the American continent and migrating directly east and west to the ocean coasts." While it is easy to prove that the marbled godwit formerly was much more abundant than it is now, it is doubtful if the bird ever existed in numbers comparable to certain other shorebirds, as the curlews and various sandpipers. Wherever it was found, the bird carried with it its own death warrant in its large size, excellent flesh, and its trusting disposition, which not only made it easy to decoy but prompted it to return once and again at the call of wounded comrades. Strict observance of the Federal regulation which prohibits the killing of this and certain other shorebirds until 1918, may possibly save the marbled godwit from extinction, but friends of our shorebirds may well watch with anxious foreboding the history of this bird during the next few years.

WILLET (Catoptrophorus semipalmatus semipalmatus).

Range: Breeds from Virginia (formerly from Nova Scotia) south to Florida and the Bahamas; winters from the Bahamas to Brazil and Peru.

The willet, including under this name both the eastern and the western forms, ranges widely over the United States and formerly bred in suitable localities over much of our territory. On the Atlantic it nested from Nova Scotia to the Gulf of Mexico, and probably small numbers yet nest on some of the sandy islands southward. At first thought it may seem strange that a bird so abundant and so widely distributed as the willet should have been so reduced in numbers, but the real wonder is that any remain after the treatment the species has been subjected to. The bird is wary enough and when alarmed informs the whole neighborhood by its loud outcries of the presence of danger. Yet as the result of being shot in season and out of season the species has at length been brought within measurable distance of the end. This statement applies more particularly to the eastern bird. The western form has escaped better, and in fall many of the western-bred birds visit the Atlantic coast. The process of exterminating our eastern willet was accelerated along the coast by the quite uniform practice of robbing the nests for the large and palatable eggs. Under the circumstances, no prophet was needed to foretell the inevitable end. To what extent the willet will be affected by the present Federal regulations remains to be seen. The essential facts regarding the willet and the fate that awaits it are known to many sportsmen, but it is to be feared that the destruction of this and other species may be hastened by the feeling among them that if the residents of one particular State or locality do not get the few remaining shorebirds others will.

HUDSONIAN GODWIT (Limosa hæmastica).

Range: Breeds from the lower Anderson River southeast to central Keewatin; winters in Argentina, Patagonia, and the Falkland Islands.

Nothing less than two continents suffice to satisfy the roving disposition of the Hudsonian godwit which, according to Cooke, probably breeds on the barren ground from the mouth of the Mackenzie to Hudson Bay. The species winters in Argentina and Chile and after leaving our northeast coast probably reaches winter quarters by an all-sea route. On the return journey in spring the godwit reaches Texas in April, and follows up the Mississippi Valley, thus, in a general way, duplicating the route of the golden plover. The Hudsonian godwit has been greatly aided in its struggle with fate in the shape of merciless sportsmen by the fact that its breeding grounds are in a distant and desolate region where its parental duties are little interfered with. Though to-day more numerous than the marbled godwit, its destiny is equally sure and almost as imminent. Nothing short of absolute protection for a term of years will save the species from extinction. Under the Federal regulations, the Hudsonian godwit, like some of its relatives, is given a close season till 1918. Such regulations are easy to enact but are difficult of enforcement, especially in remote districts, and unless the cordial cooperation of the devotees of the shotgun can be secured, the fate of this species, and some others as well, is only too certain.

LONG-BILLED CURLEW (Numenius americanus).

Range: Breeds from central British Columbia, southern Saskatchewan, and Manitoba to northeastern California, northern New Mexico, and northwestern Texas; winters from central California and southern Arizona south to Guatemala, and on Atlantic coast from South Carolina to Florida, Louisiana, and Texas.

Few in our times have known this big curlew in the Atlantic States, although a century or less ago flocks of considerable size were not uncommon. Many of us, however, have made the acquaintance of the bird in the Western States, where it breeds or did breed, from Canada to Texas. Those best acquainted with the recent status of the bird see little hope for it. The natural extension of agriculture has greatly limited its breeding grounds, and for this there is no remedy. Nor should one be desired, since in the mind of every right thinking citizen farms are more important than breeding grounds for curlew. Nevertheless, the curlew is not an over-shy bird, and, if accorded reasonable treatment, and left undisturbed during the breeding season, would long survive in its old haunts. Protected till 1918 under the Federal law, it needs in addition only the protection of public sentiment to live on indefinitely. Its flesh is rather tough and dry, even on the prairies where it feeds much upon insects and berries, while in its seaside resorts, where it subsists on marine life, its meat is too strong to be palatable. As the bird eats many insects and crawfish, we may plead its utility as an additional argument in its favor, and beg sportsmen and others who may be said to hold the life of the species in their hands to abstain from killing curlews. Continued shooting means speedy extinction.

HUDSONIAN CURLEW (Numenius hudsonicus) (See page 148).

ESKIMO CURLEW (Numenius borealis) (See page 148).



GREATER YELLOW LEGS LESSER YELLOW LEGS



Male Female
RUDDY TURNSTONE BLACK TURNSTONE (Top)



Winter Plumage Spring Plumage
BLACK-BELLIED PLOVER



Winter Plumage Summer Plumage
GOLDEN PLOVER

GREATER YELLOW-LEGS (Totanus melanoleucus).

Range: Breeds from Lake Iliamna, Alaska, and southern Mackenzie to southern British Columbia, Ungava, Labrador, and Anticosti Island; winters from southern California, Texas, Louisiana, and Georgia south to Patagonia.

The yellow-legs is one of the largest and most conspicuous of our shorebirds, and though greatly reduced in numbers, is still comparatively abundant. Like many other shorebirds, its numbers vary locally and with different years, such fluctuations being chiefly due no doubt to favorable and unfavorable breeding seasons in the far North. On the eastern coast the yellow-legs has learned that flight over the sea to its winter quarters in South America is safer than an all-land route where expectant gunners beset the shores, and this practical knowledge has greatly aided in conserving the species. The bird has a loud and mellow call note which is easily imitated and is often employed in connection with wooden decoys to lure a flock within range of the deadly shotgun. Experience, however, soon teaches the yellow-legs to be shy and suspicious, and its long neck and still longer legs eminently fit it for the post of watchman in a flock of shorebirds. For our big wader has a most friendly disposition, and associates on the closest terms with other members of the long-legged fraternity, both large and small. Hence among them its loud call has come to be recognized as a warning of danger.

LESSER YELLOW-LEGS (Totanus flavipes) (See page 148).

BLACK-BELLIED PLOVER (Squatarola squatarola).

Range: Breeds on the Arctic coast from Point Barrow to Boothia and Melville Peninsulas; also on the Arctic coast of Russia and Siberia; winters from California, Louisiana, and North Carolina to Brazil and Peru.

The "beetle-head" bears a rather close superficial resemblance to the golden plover, with which it sometimes associates, but the sportsman with quarry in hand can instantly distinguish them by a glance at the toes. If there are three toes in front and one behind, his bird is the beetle-head. The golden plover has only three toes. Like the golden plover the beetle-head breeds in Arctic lands, but unlike that bird it uses practically the same fly lines summer and fall. It inhabits both the Atlantic and Pacific coasts and also a wide strip of the interior, including the Mississippi Valley. The black-belly was formerly very abundant over most of its range, but has suffered a marked decrease in the past fifty years. It is possible that the abolition of spring shooting in a few of the Atlantic States has had an effect in retarding its decrease. It is to be hoped that this is true and that, as all shooting of this species is prohibited until 1918, the beetle-head will make substantial gains. If sportsmen and others interested can be convinced that protective measures are effective, and that under them some of our more important game birds are materially increasing, it may be possible to secure their cooperation in a really effective enforcement of protective regulations, not only in favor of the present species, but of shorebirds generally.

RUDDY TURNSTONE (Arenaria interpres morinella).

Range: Breeds on Arctic shores from Mackenzie River east, probably to Melville Peninsula, and north to Melville Island; winters from central California, Texas, Louisiana, and South Carolina to southern Brazil and central Chile.

The curious little turnstone or "calico-back" differs in many respects from other shorebirds. It has a short stout bill, short stocky legs, and a vigorous compact body, and this unusual combination enables it to perform stunts unknown to shorebirds generally. Thus it obtains no inconsiderable part of its food by prying over stones, shells, or sods with its bill, for the purpose of securing the small insect life that lurks underneath. Forbush states that formerly the turnstone was of much economic importance along the New England coast, where it was known to gunners as "chicken plover," and was shot in great numbers. This turnstone is notable as being one of the first shorebirds to figure in protective measures, being protected at night under a Massachusetts law passed in 1835, together with the plover, curlew, and doughbird. Though enjoying legal protection, as the phrase goes, the bird was little protected in fact, as results show. It is true that the species has lasted till now, but it has because comparatively uncommon. Its existence to-day is due less to the protection it received in the past than to the inaccessibility of its breeding grounds in the far North. In the southern islands, where it winters, it sometimes plays a remarkable role. Who would imagine that one of our small shorebirds could be made to do duty as a game cock! But Dr. Finsch states (Ibis, 1881) that the natives keep turnstones in cages for pets, and match them against each other, as game cocks are elsewhere matched.

BLACK TURNSTONE (Arenaria melanocephala) (See page 148).

GOLDEN PLOVER (Charadrius dominicus dominicus).

Range: Breeds from Kotzebue Sound along the Arctic coast to mouth of Mackenzie, and from Melville Island, Wellington Channel, and Melville Peninsula south to northwestern Hudson Bay; winters on the pampas of Brazil and Argentina.

At one season or another the golden plover occurs over practically all of the United States and formerly its numbers were enormous. The migrations of this plover are unique among shorebirds. Under ordinary circumstances, the route the bird follows to its Argentine wintering grounds protects it completely, since when it leaves Labrador it boldly strikes across the ocean and, unless deflected by storms, apparently does not fold its wings until it reaches the South American Continent. So long a flight without resting may seem impossible for a bird as small as this plover. We know, however, that a close relative, the Pacific golden plover, flies from Alaska to the Hawaiian Archipelago, a distance of quite 2,000 miles. While the Atlantic species might stop to rest if it would, the Pacific coast species has no stopping place between its starting point and its destination. Probably, as Cooke surmises, from food consideration the Atlantic coast species returns in spring by an all land route, and passes up the Mississippi Valley in great numbers. Though protected in fall from sportsmen by the route it follows, spring shooting in the Mississippi Valley has depleted the ranks of this plover to a pitiful remnant of its former numbers. The time has indeed long passed when a party of sportsmen, however large, can kill forty-eight thousand plover in a day, as Audubon states was done near New Orleans in 1821, and now the question to be solved is whether protection during its spring migration comes too late to save the species.



KILLDEER



BAND-TAILED PIGEON



Male Female

PASSENGER PIGEON



Male Female

MOURNING DOVE

KILLDEER (Oxyechus vociferus).

Range: Breeds from central British Columbia, southern Mackenzie, central Keewatin, and central Quebec south to Gulf coast and central Mexico; winters from California, Arizona, Texas, Indiana, New Jersey, and Bermuda south to Venezuela and Peru.

The killdeer is unquestionably one of the most widely distributed and one of the best known of the plover tribe. The bird student who makes its acquaintance need not ask its name, for the bird never tires of repeating it at all seasons. Its vociferous iteration of "kill-deer, kill-deer" brings down on its offending head the wrath of the sportsman whose cherished plans for a successful stalk of a flock of ducks are upset by its excited cries, rightly interpreted by the ducks as signals of danger not to be neglected.

Though the killdeer is a plover, he cares very little for the seacoast, nor overmuch for the neighborhood of water, but finds all his wants supplied in upland pastures and plowed lands. His bill of fare is a long and varied one, and includes many pestiferous kinds of insects. As the bird's flesh is little esteemed and its services are of decided value to man, no very good reason appears why the species should not flourish. But though the bird is still numerous, it has been exterminated in many localities. As it is now protected under the Federal law we may look to see it again occupy territory from which it has been long absent. There is the more reason to expect this since the killdeer responds quickly enough to decent treatment, as is evidenced by the fact that a pair has nested for three successive seasons on a golf course near Washington, D. C. Despite the fact that the location of the nest was known to at least a hundred players and caddies, and that the piece of "rough" in which the nest was located was invaded scores of times daily, the birds were successful in bringing out their young each year, though plovers never had a more exciting time doing it.

PASSENGER PIGEON (Ectopistes migratorius).

Range: Bred formerly from middle western Mackenzie, central Keewatin, central Quebec, and Nova Scotia south to Kansas, Mississippi, Pennsylvania, and New York; wintered principally from Arkansas and North Carolina south to central Texas, Louisiana, and Florida.

On September 1, 1914, aged twenty years, departed this life the sole surviving passenger pigeon. This brief obituary records the disappearance from earth not only of the last survivor of a notable American game bird, but, what is infinitely sadder, the passing of a species. The history of the passenger pigeon from the first settlement to and including our own times reads like a romance, but a romance tinged on every page with man's cruelty, rapacity, and shortsightedness. Early accounts of the enormous numbers of this pigeon that migrated from section to section read like fables, but they are too well attested to be doubted. Wood's account of the passenger pigeon (1629-34) is so quaint I subjoin part of it:

"These Birds come into the Countrey, to goe to the North parts in the beginning of our Spring, at which time (if I may be counted worthy to be believed in a thing that is not so strange as true) I have seene them fly as if the Ayerie regiment had beene Pigeons; seeing neyther beginning nor ending, length or breadth of these Millions of Millions."

Audubon states that he rode through a winter roosting-place in Kentucky which was more than forty miles long and three miles wide. It may be doubted if in the prime days of this pigeon its numbers were ever equalled by any bird, either in the Old World or the New. Only its great numbers enabled it to survive the assaults of its enemies as long as it did. Then came the market netter, and everywhere the hapless pigeons were taken in season and out of season, with eggs in their bodies ready for the nest and with nests full of young. While neither the netter nor the sportsman is responsible for the extermination of the last passenger pigeon, it is nevertheless true that by the combined assaults of the two, the species was reduced to such a low ebb that it could not recover. Protective legislation was too late.

BAND-TAILED PIGEON (Columba fasciata fasciata).

Range: Breeds from southwestern British Columbia, western Washington, western Oregon, northern Utah, and north-central Colorado south through southwestern United States and Mexico to Nicaragua, and east to western Texas; winters from southwestern United States southward.

Though bearing no very close resemblance to the passenger pigeon, the band-tail may be said to represent that bird on the Pacific coast. Like the pigeons generally, the band-tails are sociable, and flocks of hundreds used to be common in the oak groves of southern California.

They are extremely fond of acorns, and although of late years persecution has made them wary they will risk much to obtain their favorite food. When they find a well-laden oak tree they will swallow acorns till they are full to the very bill. As their soft bills are totally inadequate to hull the acorn, they swallow shells and all, and such are their powers of digestion that they can dispose of at least two full meals every day. They are said to breed in Arizona nearly every month of the year, and Vernon Bailey found them nesting in the Guadalupe Mountains, Texas, as late as August. Their note in the breeding season is a hoot singularly like an owl's, but most of the year they are silent. On the west coast for years they have been persistently hunted, and as they breed in the mountains, which are much resorted to by summer campers, the limits of the close season are by no means always observed. It is high time to take active measures for the preservation of the band-tail, otherwise it will soon meet the same fate as the passenger pigeon.

MOURNING DOVE (Zenaidura macroura carolinensis).

Range: Breeds from British Columbia, Saskatchewan, Manitoba, Ontario, and southern Nova Scotia south throughout the United States and Mexico, and locally in Lower California and Guatemala; winters from southern Oregon, southern Colorado, the Ohio Valley, and North Carolina to Panama.

The mourning dove is in no present danger of extinction. Several traits contribute to its safety. Although sociable enough, it never assembles in vast flocks which act as a unit, but the pairs nest more or less apart and only in fall and winter assemble in large numbers in their favorite feeding places. Hence, netting the bird on a large scale is impossible. Then, too, though the mourning dove never lays more than two eggs and sometimes only one, it is very prolific, since it often nests twice, and sometimes three times in a year. Its prowess of wing renders it indifferent to miles, and we used to see mourning doves in the western deserts, miles away from their nesting places, traversing with swift pinions the desert spaces toward some distant watering hole which they alone knew of. The thirsty prospector, when he observes numbers of doves hurriedly pursuing the same line of flight in the hotter hours of the day, shapes his course accordingly and usually finds water.



MOUNTAIN QUAIL



Male Female

VALLEY QUAIL



Female Male

GAMBEL'S QUAIL



SCALED QUAIL CHESTNUT-BELLIED SCALED QUAIL

MOUNTAIN QUAIL (Oreortyx picta picta).

Range: Pacific coast from southwestern Washington south to Monterey County, California.

All our American quail are beautiful, but this superb denizen of the mountain sides bears away the palm. Its elegant form, rich coloration, its long, nodding black plumes, its brown gorget, and its alert carriage lend the bird an air of rare distinction. Our plumed knight of the mountains loves not the low country with its dry watercourses, its heat and dust, but chooses for his permanent home the mountain valleys and hillsides with their pure air and numerous streams. This quail, with its two varieties, is strictly limited to the west coast where it ranges from Lower California into Washington. Formerly it was abundant over most of its range, and it is yet numerous in many localities. In Oregon it used to be trapped in great numbers, and as long ago as 1880 was commonly exposed in the city markets in crates containing twenty or more. Even the market men decried the practice, but nevertheless cheerfully sold the birds at three dollars per dozen. A sad sight it was to see these beautiful creatures captive and exposed for sale. My own experience with the mountain quail dates back many years. All the covies I saw in California and Oregon were comparatively small, always less than ten, and the bird appears rarely, if ever, to associate in great gatherings composed of several or more independent covies, as does the valley and Gambel's quail. When in their ordinary mountain haunts, plumed quail are tame enough, altogether too tame for their own safety, but I am told that where much pursued by sportsmen with or without dogs, they rapidly lose their unsophisticated ways and learn to take good care of themselves.

VALLEY QUAIL (Lophortyx californica californica).

Range: Pacific coast region from southwestern Oregon south to Monterey County, California; introduced into Vancouver Island, Washington, and Colorado.

The two forms of quail inhabiting the coast and valley regions of Oregon and California, though differing enough in plumage to constitute races, are very similar in habits. As its name implies, the bird prefers valleys to mountains, although it may range upward as high as four thousand feet, at about which point it meets the habitat of its larger relative, the mountain quail. The valley quail is widely distributed, and being very prolific, it is, or was, exceedingly abundant over most of its range. Eastern sportsmen, knowing only our Bob-white, would find it difficult to credit tales that might be told of the numbers of valley quail that formerly congregated in favorable localities. Flocks of over two hundred were common enough, but in the late seventies and eighties I have occasionally seen several thousand assembled together near water. When flushed, successive bands of hundreds rose simultaneously with an extraordinary whir of wings, and the air was filled with their flying forms. Such sights are of the past, although the valley quail is still numerous in many regions. It is on good terms with civilization and is prone to frequent cultivated tracts, especially vineyards and gardens, even on the outskirts of populous towns. Its fondness for grapes does not endear it to the vine grower, and he often has to resort to extreme measures to protect the bunches of ripe fruit which probably furnish the quail not with food but with water, for this quail discovered the virtues of grape juice long before it was put on the market.

GAMBEL'S QUAIL (Lophortyx gambeli).

Range: Desert region of southern California, southern Nevada, Arizona, and southwestern Utah, east to the southwestern corner of Colorado; also in southwestern New Mexico to the Rio Grande Valley and the El Paso region of extreme western Texas, and south into the northeastern corner of Lower California and to Guaymas, Sonora.

Though differing markedly in coloration from the valley quail of the Pacific coast, Gambel's quail so closely resembles that bird in size and general habits that in my mind the two are inseparable. That the quail themselves are sometimes misled by the likeness would appear from the fact that the two readily hybridize, and I have seen a number of the hybrids from southeastern California. This quail prefers cañon bottoms and rocky hillsides for hunting grounds, and the speed with which the individuals of a frightened covey can make good their escape among rocks and bushes is surprising. Gambel's quail trusts for safety first to its legs and only secondarily to its wings, while it is rare indeed that it resorts to Bob-white's favorite ruse of close hiding. Ordinarily in fall it associates in large bands —they can scarcely be called covies, since they are the aggregate of many covies— and under these circumstances the pot hunter who cannot slay his scores must indeed be a bungler. Gambel's quail is no stranger in vineyard and garden, although for the most part it frequents scantily inhabited districts. In one respect both Gambel's and the California valley quail have greatly the advantage over Bob-white since, if these two western species ever roosted on the ground, they long ago abandoned the habit in favor of trees and thick undergrowth, where they are safe from most prowlers of the darkness.

SCALED QUAIL (Callipepla squamata squamata).

Range: From central Arizona to western Texas, north to southern Colorado and over most of the Panhandle of Texas, east nearly to central Texas, and south to the Valley of Mexico.

The cottontop, as the scaled quail has been dubbed from its conspicuous whitish crest, has a restricted range in the United States along our southern border. The country it frequents is dry and barren, and chaparral and mesquite form its favorite cover. On account of the dry nature of quails' food they are greatly dependent upon water, and hence the presence of large numbers of cottontops may be taken as a pretty sure indication that a stream or waterhole is not far away. Western quail of whatever species have learned to trust to their legs rather than their wings to carry them out of harm's way, and the cottontop forms no exception to the rule. When alarmed, a bevy will scatter hither and yon among the rocks or brush, to come together again when the supposed danger is past. When hard pressed it is an adept at close hiding. The bluish gray plumage of the cottontop harmonizes well with its usual surroundings and no doubt the confidence the bird reposes in its protective coloration is justified by long experience. Protected by the remoteness of its desert home this quail should long survive the fate of some of its less fortunate relatives, though the automobile, with its power to annihilate distance, is a new danger which it has yet to meet.

The habits of the chestnut-bellied scaled quail are so similar to those of the present species as not to call for separate mention. The bird ranges from the lower Rio Grande Valley in Texas to Coahuila and Nuevo Leon, Mexico.



Male Female

MEARN'S QUAIL



Male Female

BOB-WHITE



Male

RUFFED GROUSE



Female Male Male

SPRUCE GROUSE FRANKLIN'S GROUSE

MEARN'S QUAIL (Cyrtonyx montezumæ mearnsi).

Range: From central Arizona and central New Mexico east to central Texas, and south to the mountains of northern Coahuila, Chihuahua, and eastern Sonora.

Mearn's quail is a Mexican species which crossed our borders long before there were political boundaries, and established itself in the low mountain ranges of our western border States, where in time it changed somewhat from the parent stock. Although I have spent considerable time in the country it inhabits, chiefly in eastern Arizona, I never found it numerous, and though I searched persistently only occasionally discovered a small covey. If I am to judge by my rather limited experience, Mearn's quail is the tamest of its kind, and well deserves the epithet of "fool quail" locally bestowed on it. So closely does the bird lie after being once started that I found it almost impossible to flush one a second time unless I marked it down to the foot. I have observed one sitting motionless on a log by the side of the trail, within riding-whip distance of a passing mule train, apparently so petrified with astonishment as to be incapable of motion.

RUFFED GROUSE (Bonasa umbellus umbellus).

Range: Eastern United States from Minnesota, Michigan, southern New York, and southern Vermont south to eastern Kansas, northern Arkansas, Tennessee, and Virginia, and in the Alleghenies to northern Georgia.

This, the partridge of the northern woods, the pheasant of the South, may well be termed the prince of American game birds. Its high position, however, is likely soon to be vacant and its place taken by some lesser member of the game-bird galaxy unless vigorous efforts are made to check its decrease. Possessed of a vigorous constitution which enables the bird to brave the northern winter and defy all ordinary vicissitudes of weather, vigilant and shy where much persecuted, strong of wing and skilled in many a wile by means of which to elude the sportsman and his keen-scented dog, our partridge is well equipped to make a brave fight for existence. And how bravely has it faced its fate! Though usually a resident of extensive forested tracts it is amazing how long the ruffed grouse will continue to live in leafy swamps of a few acres, or on little wooded islands, mere relics of its former forested domain. Gun and dog, natural diseases, sleety storms, and unfavorable breeding seasons are most potent for harm, while the high price placed on its flesh in the market is having its natural effect. In much of its range little time remains in which to save it. It is non-migratory, and hence only the States in which it lives can avert its impending doom. That the bird can be propagated in confinement is much in its favor, and a little of the money spent in attempts to introduce foreign game birds would go a long way toward rehabilitating the partridge. No sound that echoes through our woods has quite the effect on the wayside stroller as the martial summons of the ruffed grouse, and it will be thrice a pity if future generations must miss the spring and fall roll call of this woodland drummer.

BOB-WHITE (Colinus virginianus virginianus).

Range: Eastern North America from South Dakota, southern Minnesota, southern Ontario, and southwestern Maine south to eastern and northern Texas, the Gulf coast, and northern Florida, west to eastern Colorado.

Whatever this little friend of ours says to us in spring, whether "bob-white," as many interpret it, or "more-more-wet," according to the practical farmer, he utters it in such vigorous, albeit mellow tones, that he thereby endears himself to all hearts. And how many there are who, as the promises of spring are fulfilled by opening summer, listen for the cheerful message of this blithe whistler of fence post and thicket and are made happier when they hear it. And "Bobby" is no recluse of the thick woods. He loves the brier patch, the brown stubble, and the open, weedy field. The bright sunlight shines for him, and his loud, cheery call is sounded from some vantage point in the open as though he would have all the world hear his challenge to produce anything more beautiful than his little brown mate snugly hidden away near by. Long may his cheery whistle sound through the land. There is no reason why it should not, save the too ardent zeal of the sportsman and the greed of the epicure. Bob-white is prolific, knows pretty well how to take care of himself, and, if need be, can be reared in captivity. The fate of Bob-white, as of some other non-migratory game birds, rests solely with the several States within which he dwells. Unquestionably, in most States, the present bag limit is altogether too high and should be materially reduced. The farmer, too, should have a word to say in the premises since the food of Bob-white is such that he cannot afford to permit unlimited quail-shooting over his farm, but should jealously guard his covies and be sure that enough pairs are left to insure the future of the species.

SPRUCE GROUSE (Canachites canadensis canace).

Range: Manitoba, southern Ontario, and New Brunswick south to northern parts of Minnesota, Wisconsin, Michigan, New York, and New England.

The history of the spruce partridge must be written mostly in the past tense, so far at least as the United States is concerned. It used to be common in Michigan, the Adirondack region of New York, and in northern New England, but in all three districts is now either rare or altogether wanting. The unsuspicious nature of this grouse and its total obliviousness to danger from human beings, or rather inhuman beings, probably had more to do with its sad end than anything else. It is said that when a flock was surprised in trees, one after another could be shot down till the last one was gone. As the grouse is practically non-migratory, its preservation depends solely on the States in which it lives, and upon them must rest the responsibility for its fate.

FRANKLIN'S GROUSE (Canachites franklini).

Range: Southern Alaska, central British Columbia, and west-central Alberta south to northern Oregon, central Idaho, and western Montana.

Franklin's grouse was first described by Lewis and Clarke who saw it in Idaho while on their memorable trip to the Pacific coast. While thus known for more than a century, surprisingly little has been recorded concerning its mode of life. From the close similarity it bears to the spruce partridge of the East, it no doubt possesses very similar habits. At least it has the same confiding disposition as that bird, as is attested by the fact that its habit of standing in amazed curiosity to watch the movements of an approaching foe intent on its destruction has earned it the contemptuous epithet of "fool hen." Like our ruffed grouse, this bird is a drummer, but instead of sounding the roll from rock or log, the male drums, according to Dawson, by rapidly beating the air with his wings as he slowly sinks from some elevated station or mounts upwards to it.



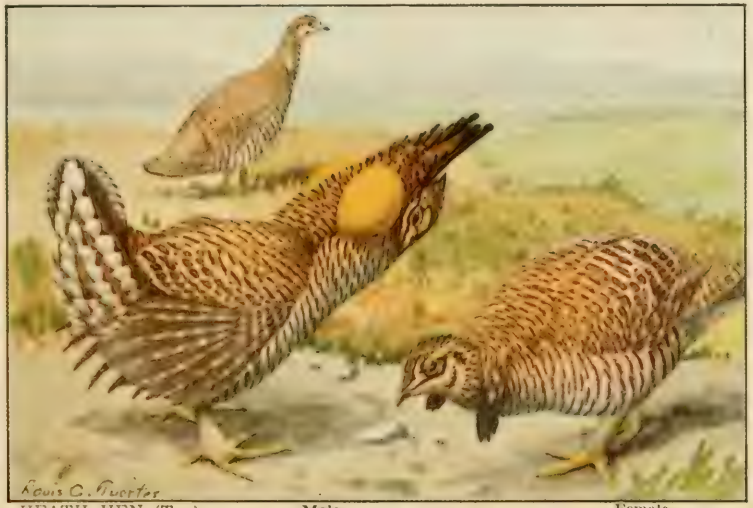
Male Female

DUSKY GROUSE



Male Female

SAGE HEN



HEATH HEN (Top) Male Female

PRAIRIE CHICKEN



SHARP-TAILED GROUSE

DUSKY GROUSE (Dendragapus obscurus obscurus).

Range: Rocky Mountains from northern Utah and northern Colorado to central western New Mexico and central Arizona, and west to East Humboldt Mountains, Nevada.

This large and beautiful grouse affords an excellent illustration of the effect of the gun on the disposition and habits of a game bird. An inhabitant of the mountains and too small to be much hunted by the Indians when larger game was so abundant, this grouse in early days exhibited the extreme of tameness and indifference. I have many times seen parties of from six to a dozen that scarcely took the trouble to move out of the trail, so entirely unconscious of danger were they and so curious as to the errand of the intruder. Under such circumstances, when alarmed by a gun the flock is apt to betake itself to the nearest trees and sit motionless on the branches, evidently believing themselves to be invisible. The term "fool hen," by which they are known, rather aptly describes their conduct and demeanor on such occasions. Even the "fool hen," however, can profit by experience, and the lesson of caution once learned, it is as shy as it previously was tame. Its flesh is delicious eating and the mountain camper rarely loses an opportunity to feast on it. In spring the loud and sonorous hooting of the grouse coming from some giant pine in ravine and cañon, can be heard for long distances, and has such marked ventriloquial effect that it is difficult to locate the boomer or to tell whether he is far away or close at hand.

HEATH HEN (Tympanuchus cupido).

Range: Island of Marthas Vineyard, Massachusetts.

So late as the first year of the present century the heath hen was still more or less common in the Middle and Eastern States. Still earlier the bird was probably rather generally distributed over the territory east of the Alleghenies. We have no reason to be proud of the course taken by legislation in favor of the heath hen, though we need not go back to the last century for even more flagrant examples of the failure of protective legislation. First, as is usual in such cases, all legislation halted till the bird was well on the road to extinction. Then laws were passed, adequate enough, if properly enforced; but they were openly and frankly ignored or repealed or modified no doubt under the time-worn arguments of the present day: the importance to sportsmen of an open season; the need for meat; with the corollary, that the species at that particular period was in no danger. And the result was the same as in the case of the passenger pigeon, and as it will be soon in the case of the prairie chicken.

Marthas Vineyard, Massachusetts, now holds the last pitiful remnant of this fine game bird which, under the protection of the State, has increased from a few couples to about two hundred. How long this little band of survivors will be able to hold fate at bay remains to be seen. It would seem to be the part of wisdom to found other colonies and so increase the chances of survival.

PRAIRIE CHICKEN (Tympanuchus americanus americanus).

Range: Southeastern Saskatchewan and southern Manitoba to eastern Colorado, northeastern Texas, Arkansas, western Kentucky, and Indiana.

"The chicken" is a lover of the open prairie and as a substitute readily accepted the wheat and cornfields of the early settlers, in which it was, and still is, a valuable ally of agriculture. However great its value to the farmer, if we are to judge from present appearances, this fine prairie grouse must soon be written of in the past tense. Formerly abundant all over the Mississippi region from Manitoba south to Louisiana and Texas, and extending as far west as Colorado, to-day only a scant remnant of its former numbers is left, and this remnant is fast dwindling under the combined attacks of sportsmen who should know better, and of gunners who neither know nor care for consequences. Ranging only a short distance north of our boundaries, the prairie chicken is in the strict sense of the word an American game bird, and one must go far to find a finer. Being non-migratory, it is State property, and its fate rests solely with the individual States within which it resides. Considering its past abundance, the fine sport its pursuit affords to the legitimate sportsman, its delicacy for the table, and the valuable service it renders the farmer in destroying his insect enemies, the record of its treatment is a shameful one. In many States no protection whatever was given the bird till its extinction was practically assured, while in the States in which adequate legislation has been enacted, open seasons, too large bag limits, and inadequate enforcement of the laws have produced their inevitable effect. Nothing short of a closed season for a term of years will turn the tide and save this noble bird from extinction.

SAGE HEN (Centrocercus urophasianus).

Range: Sagebrush plains from middle southern British Columbia, southern Saskatchewan, and northwestern North Dakota to middle eastern California, northwestern New Mexico, and northwestern Nebraska.

To make the acquaintance of the sage hen, the largest of the grouse family in the United States, one must leave the region of forests and greenery and betake himself to the barren plains country where grows in abundance the Artemisia or sage brush. This aromatic plant furnishes the bird not only safe cover but also food. Indeed, sage leaves constitute such a large part of the regular fare of the old birds that their flesh becomes strongly tainted, and he must be hungry indeed who relishes it. The flesh of the young, however, is excellent. Owing to its large size and its tameness it makes the easiest of marks, and unless special attention is given to its preservation the bird will before long become rare. The yellow air sacs on the neck of the male are inflated to enormous size during the mating season, and together with his curious antics no doubt suffice to render him irresistible to the female.

SHARP-TAILED GROUSE (Pediœcetes phasianellus phasianellus).

Range: Central Alaska and northwestern British Columbia east through central Keewatin to central western Ungava, and south to Lake Superior and the Parry Sound district, Ontario.

The sharp-tailed grouse, including under this name its three forms, has an extensive range in the far West, but formerly extended far enough eastward to meet the range of the true prairie hen in Wisconsin and Illinois where, however, it has been nearly if not quite exterminated. As a rule, it inhabited wilder and rougher country than the prairie hen, and never was so abundant. The free use of the shotgun in recent years has taught the sharp-tail some important lessons, and its wariness, seconded by its powerful wings, are sufficient to insure the perpetuity of the species if the Western States in which it lives, profiting by the sad lesson of the prairie chicken and heath hen in the East, afford it the needed protection. Unless, however, its pursuit be carefully regulated, its race will soon be run, and another name added to the lengthening list of extinct American game birds.



Male and Female Summer Plumage — Winter Plumage

WILLOW PTARMIGAN



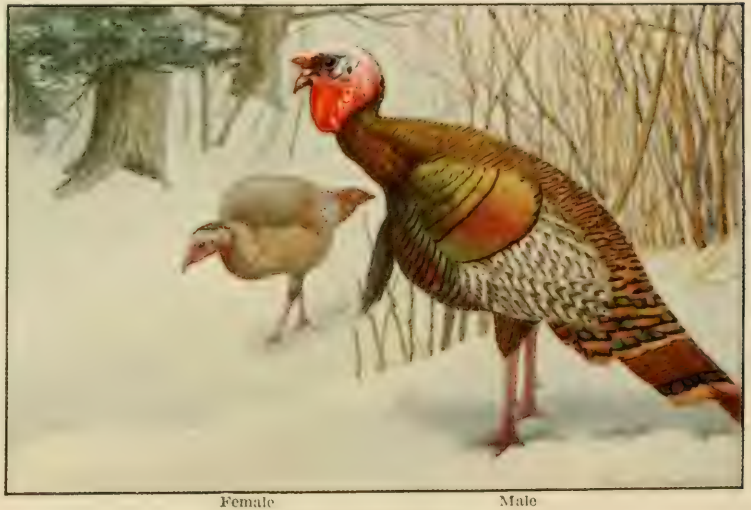
Male and Female Summer Plumage — Male Winter Plumage

WHITE-TAILED PTARMIGAN



Female — Male

RING-NECKED PHEASANT



Female — Male

WILD TURKEY

WILLOW PTARMIGAN (Lagopus lagopus lagopus).

Range: Breeds from northern Alaska, northern Banks Land, and central Greenland south to eastern Aleutian Islands, central Mackenzie, central Keewatin, James Bay, and southern Ungava; south in winter to northern British Columbia, Saskatchewan Valley, Minnesota, Ontario, and Quebec.

To make the acquaintance of the willow ptarmigan in its chosen home one must visit the open tundras on the borders of Bering Sea and the Arctic coast. Though not known to breed south of Labrador, the bird migrates in winter to the St. Lawrence, and occasionally a straggler crosses our own boundary. In Alaska in autumn willow ptarmigan unite in great flocks, numbering thousands, and migrate to the neighborhood of the Yukon and its tributaries, finding there both food and shelter. During the winter ptarmigan play an important role in the life of both the Eskimo and the Indian and are snared and shot in great numbers, often indeed forming the natives' only resource against the ever-recurring periods of want and even famine. On the Kaviak Peninsula the Eskimo have taken advantage of the habitual low flight of the bird—only a few feet above the surface—to net them in a curious way. Nelson thus describes it: "Taking a long and medium fine-meshed fishing net they spread it by fastening cross-pieces to it at certain distances; then taking their places just at sunset in early November or the last of October, on a low, open valley or 'swale,' extending north and south, they stretch the net across the middle of this highway, with a man and sometimes two at each cross-piece, while the women and children conceal themselves behind the neighboring clumps of bushes. As twilight advances the net is raised and held upright. Ere long the flocks of ptarmigan are seen approaching, skimming along close to the snow-covered earth in the dim twilight, and a moment later, as the first birds come in contact with the obstacle, the men press the net down upon the snow sometimes securing fifty to sixty birds."

RING-NECKED PHEASANT (Phasianus torquatus).

Range: First introduced from China into the United States near Portland, Oregon, in 1881. At present established in many other localities, including the following: Puget Sound; Vancouver Island; British Columbia; Cape Cod, Massachusetts; Genesee Valley, New York; and Jekyll Island, Georgia.

This splendid game bird is a native of China, whence it has been introduced into British Columbia, Washington, Oregon, and California, and less successfully in eastern United States. From the first the bird throve wonderfully in Oregon, as introduced game rarely does, and to-day it is probably the most abundant game bird in that State. The pheasant has not escaped censure on the score of its damage to crops, and it is undoubtedly true that it has a keen appetite for corn, peas, grain, and even potatoes. The introduction of a large game bird like the pheasant into our domains is very different from the introduction of a small species like the English sparrow. Unlike the damage done by the sparrow, the mischief of the pheasant can be checked at any time desired by simply extending the open season. Pheasants, however, are naturally hardy and prolific, and once established in a region need only reasonable protection to insure their perpetuation for all time.

WHITE-TAILED PTARMIGAN (Lagopus leucurus leucurus).

Range: Rocky Mountains from northern British Columbia and central Alberta south to Vancouver Island, Washington, northwestern Montana, Colorado, and northern New Mexico.

This hardy ptarmigan, including its Rocky Mountain representative, is an inhabitant of the mountain tops above timber line, and here it lives contentedly summer and winter. Having few foes to contend with, and man being only a casual visitor to its fastnesses, it is likely to continue indefinitely its lonely life among frowning rocks and glistening glaciers. Their mottled plumage in summer and their white robes in winter greatly aid the ptarmigan in their hard struggle for existence, and to some extent at least the birds appear to realize their invisibility. Thus, the members of a flock when surprised will often remain motionless as though depending on their likeness to their surroundings for immunity. Though protected by law, the best protection for the ptarmigan is its protective coloration and its habitat, so remote from the bounds of the arch enemy, man. May they long continue to insure this timid and inoffensive bird immunity.

As is well known, as winter approaches the ptarmigan changes its plumage from a much-mixed dress of rufous, black, and white, to a snowy white. The summer dress is very inconspicuous among the vegetation which the bird frequents, while white winter robes render it no less inconspicuous when the earth is carpeted with snow. Such is one of the many ways in which Mother Nature provides for the safety of her wards.

WILD TURKEY (Meleagris gallopavo silvestris).

Range: Eastern United States from Nebraska, Kansas, western Oklahoma, and eastern Texas east to central Pennsylvania, and south to the Gulf coast.

America may well be proud of this, the King of all game birds. Wherever found, the turkey was originally very plentiful, being sufficiently intelligent and wary to hold its own against the Indian and its numerous natural enemies, particularly the wild cat and cougar. As recently as the late eighties I knew of a flock that had ranged for at least ten years not far from the banks of the Potomac within sight of the Capitol dome. Nature has furnished the turkey a pair of stout legs that enable it to range daily over a wide extent of hill and valley in its search for seeds, grasshoppers, insects, and berries. Inclined to trust to its legs when confronted by danger, it either dashes off at full speed or sneaks quietly away through the bushes, although when forced to fly its powerful wings carry it at a rapid rate. It roosts in the tops of huge trees and this habit is a strong factor for safety. In the seventies I found turkeys very numerous on the headwaters of the Gila in Arizona, and as they probably never had been hunted they were almost as tame as barnyard fowls. One might easily have killed a wagon-load in a day. To what extent the Aztecs had domesticated the wild turkey before the coming of the Spaniard is not known, but undoubtedly it was kept in captivity and had been known to the Montezumas for centuries. It is interesting to note that the turkey originally introduced into Europe from Mexico by the Spaniard was a different subspecies from our eastern wild turkey. Subsequently, the Mexican bird was reintroduced into America, particularly the Eastern States, from Europe. Easily domesticated, our wild turkey even more readily drops its acquired habits and reassumes its primitive mode of life. Thus in several of the Hawaiian Islands the forests have been stocked with domesticated birds which, after a season or two, became as wild as ever.

SURF SCOTER (Oidemia perspicillata) (See page 117).

Range: Breeds on the Pacific coast from Kotzebue Sound to Sitka, and from northwestern Mackenzie and Hudson Strait to Great Slave Lake, central Keewatin, and northern Quebec; winters on the Pacific coast from Aleutian Islands south to San Quintin Bay, Lower California, and on the Great Lakes.

The surf duck is possibly the most abundant of the three species of scoter ducks, and in fall and winter it visits the northern parts of the United States on both coasts in great numbers. It appears off the coast of Massachusetts early in September. Some idea of the vast numbers of these birds may be gained from the observations of Nelson who, late in the breeding season of 1878, saw near Stewart Island, Alaska, a continuous raft of them about ten miles long and from a half to three-fourths of a mile in width. All these appeared to be males and therefore represented only half of the birds of this species breeding in the locality. The surf scoter is a powerful swimmer and a superb diver and is almost as much at home in the surf as a fish. It lives on various kinds of shellfish, chiefly mussels. Naturally, having no means of breaking open the bivalves, it has to swallow them whole, and such are the bird's powers of digestion that it has no difficulty in disposing of the thick shells.

As bearing directly on the question of spring shooting, Mackay states that between April 15th and April 25th he has taken eggs from the ovary of the female scoter that varied in size from that of a cherry stone to that of a robin's egg. Such birds were probably mated some time before, although, as a matter of fact, it is highly probable that the adults of many, if not most, ducks mate for life, and that the pairs consort together till one or both are killed.

AMERICAN BLACK SCOTER (Oidemia americana) (See page 117).

Range: Breeds in northeastern Asia and from Kotzebue Sound to Aleutian Islands, including Near Islands; also on west shore of Hudson Bay, Ungava, and Newfoundland; winters on Asiatic coast to Japan and from islands of Bering Sea south rarely to Santa Catalina Island, California.

The American scoter is abundant in Alaska, where it breeds. It is abundant also in winter off the coast of the New England and Middle States, where it associates with the white-winged and surf scoters, the three species at this season possessing similar habits.

At St. Michaels these ducks are never seen in spring until the ice begins to break offshore and the marshes are dotted with pools of open water. Toward the end of May, writes Nelson, they leave the leads in the ice and are found in abundance among the salt- and fresh-water ponds on the great marshes, from the Yukon mouth north and south. The mating is quickly accomplished, and a nesting site chosen on the border of some pond. The spot is artfully hidden in the standing grass, and the eggs, if left by the parent, are carefully covered with grass and moss. As the set of eggs is completed, the male gradually loses interest in the female, and soon deserts her to join great flocks of his kind along the seashore, usually keeping in the vicinity of a bay, inlet, or the mouth of some large stream. A set of fresh eggs was taken on August 3d, and a brood of downy young was obtained on September 9th. Nelson adds: "They are good weather indicators, and frequently, ten or twenty hours in advance of a storm, they come into the sheltered bays, sometimes to the number of a thousand or more. At such times they show great uneasiness and frequently pass hours in circling about the bay, sometimes a hundred yards high and again close over the water, the shrill whistling of their wings making a noise which is distinctly audible nearly or quite half a mile."

SNOW GOOSE (Chen hyperboreus hyperboreus) (See page 121).

Range: Breeds from the mouth of the Mackenzie east probably to Coronation Gulf and Melville Island; winters from southern British Columbia, southern Colorado, and southern Illinois south to northern Lower California, central Mexico, Texas, and Louisiana.

For all practical purposes, the snow goose or white brant may be considered a western bird. It is, however, so much like the greater snow goose, except in size, that the eastern records of the two species are much confused, and it is difficult to determine to which bird any particular account applies. No doubt varying numbers of the lesser snow goose used to visit the Eastern States where, however, the larger goose was and is more numerous. The smaller snow goose breeds in northern latitudes, and in fall migrates in great numbers to our Southwestern States. In the early days of California it was no uncommon sight in winter to see stubble fields and pastures so covered with white brant as to seem like great snow-fields. And very beautiful these snowy tracts appeared under the bright mid-winter sun of California. The ranchmen, however, looked with no friendly eyes on these multitudes of geese, since the tender leaves of wheat are greatly relished by them. When they nip off the blades of the growing grain, little damage is done, and many claim, indeed, that the crop stools the better for it. No doubt, however, great damage sometimes resulted from too frequent cropping, and it was no uncommon practice to hire men to ride from grain field to grain field and keep up a constant fusillade to kill or scare away the geese. Though the multitudes of earlier days no longer visit California, the bird is still numerous there.

BLACK BRANT (Branta nigricans) (See page 121).

Range: Breeds on the Arctic coast and islands from Point Barrow east to near mouth of Anderson River, north probably to Melville Island; common on Siberian coast, Chukchi Peninsula, and west to New Siberian Islands; winters on Pacific coast from British Columbia south to San Quintin Bay, Lower California, and in the interior of Oregon and Nevada.

The black brant is the Pacific counterpart of the brant of the Atlantic coast, and like that bird an object of keen pursuit by the sportsmen of the region it frequents. Like its relative it retires well within the Arctic Circle in summer, and like it also is an exclusively salt-water species, feeding on marine grasses and small marine life. When in search of food, Dawson tells us, the black brant dives as well as a dipper. This brant winters on the Pacific coast in great numbers from Puget Sound southward. Twenty-five years ago it wintered in great numbers in San Diego harbor, and there was so tame and unsophisticated that only moderate skill and caution were necessary to insure a reasonable bag in a very short time. The bird was usually shot from blinds or from points as the flocks passed to and from their feeding grounds. Nelson states that this brant rarely reaches the mouth of the Yukon before May 15th, when the main flight of the other geese has passed, and many of those which remain to breed have already paired.

CACKLING GOOSE (Branta canadensis minima) (See page 121).

Range: Breeds in western Aleutians and from Norton Sound south to northern coast of Alaska Peninsula; winters from British Columbia south to San Diego County, California.

The cackling goose is simply a dwarf form of the Canada goose with somewhat darker colors. It is chiefly limited to the West-Coast States. Nelson found this the most common and generally distributed goose breeding along the Alaska coast of Bering Sea. His spirited account of it as he saw it in the Yukon Delta gives an excellent idea of the nature of the visits of this and other waterfowl to Alaska. He says: "The first goose of the season is hailed with delight by both natives and white residents, who set at work repairing their guns and making ready for the welcome change from a diet of fish, eaten all through the winter, to geese, which soon become the staple. As May advances and one by one the ponds open, and the earth looks out here and there from under its winter covering, the loud notes of the various wild fowl are heard, becoming daily more numerous. Their harsh and varied cries make sweet music to the ears of all who have just passed the winter's silence and dull monotony, and in spite of the lowering skies and occasional snow-squalls every one makes ready and is off to the marshes. The flocks come cleaving their way from afar, and as they draw near their summer homes raise a chorus of loud notes in a high-pitched tone like the syllable 'luk' rapidly repeated, and a reply rises upon all sides, until the whole marsh re-echoes with the din, and the newcomers circle slowly up to the edge of a pond amid a perfect chorus raised by the geese all about, as if in congratulation. Even upon first arrival many of the birds appear to be mated, as I have frequently shot one from a flock and seen a single bird leave its companions at once and come circling about, uttering loud call-notes."

EMPEROR GOOSE (Philacte canagica) (See page 121).

Range: Breeds from Kotzebue Sound south to the mouth of the Kuskokwim, on St. Lawrence Island, and also on Chukchi Peninsula, Siberia, near East Cape; winters from Commander and Near lands east through Aleutians to Bristol Bay and Sitka.

Geese are strong of wing and of adventurous disposition and to most of the tribe a migration of a thousand miles or so is a trifling matter. The emperor goose appears to be as strong as any of its fellows and equally good on the wing, which makes all the more remarkable the limited area it occupies in Alaska. It ordinarily ranges only from the Aleutian Islands to the vicinity of Bering Strait, and the life of the species is practically restricted within this narrow territorial compass.

Nelson enjoyed the unusual opportunity of observing the emperor goose in Alaska. "By the Aleuts these birds are called 'beach geese,'" he says, "from their habit of frequenting the island beaches to feed. These geese arrived in force in the Yukon delta about the first of June, while the river was still under a firm sheet of ice and heavy snow banks covered half the earth. Soon after arrival they paired, the males when mated being very pugnacious. They nested on the salt marshes, and the eggs, five to eight in number, were frequently deposited among the driftwood below high-water mark. The young appear about the last of June and the adults moult from the last of July to the middle of August. Now comes the opportunity of the Eskimo, who set long lines of nets across the marshes, into which they drive the hapless waterfowl which have moulted their quill feathers and cannot fly. The slaughter is enormous and the natives make it worse by killing thousands of young birds for no other purpose than to prevent them being in the way next drive."

AVOCET (Recurvirostra americana) (See page 128).

Range: Breeds from eastern Oregon, central Alberta, and southern Manitoba south to southern California, southern New Mexico, northwestern Texas, northern Iowa, and central Wisconsin; winters from southern California and southern Texas to southern Guatemala.

Though not a game bird in any proper sense, the avocet finds mention here because it furnishes a shining mark for the gunner, and in consequence has practically disappeared from the Atlantic coast. Numbers of avocets are still to be seen along the borders of sloughs and ponds in the far West, though even there the bird by no means enjoys the immunity from persecution it deserves. Its striking colors, its vociferous voice, long neck and bill, and its longer legs, combine to render the avocet so conspicuous that its only chance for safety rests in seeing its enemies before it is seen by them. Its long legs have another function as they enable the bird to wade in the shallows, where its food is chiefly obtained, while its webbed toes enable it to swim easily when need arises. Its slender, upward-curved bill may well excite wonder, but Nature knew what she was about in designing it, for its form admirably adapts it for finding and seizing any prey that may rest on the surface of the muddy ooze, or for probing for various larval forms common in fresh water. It nests on the margins of the ponds which it frequents, and no sooner does an intruder appear than it flies to meet him with loud outcries that unmistakably betray the secret it is so anxious to conceal. The avocet, so innocent and beautiful, is now protected by the Federal law and, as its flesh is worthless, neither sportsmen nor gunners have any excuse for slaughtering it.

DOWITCHER (Macrorhamphus griseus griseus) (See page 128).

Range: Breeding range unknown, but probably northern Ungava; winters from Florida and the West Indies south to northern Brazil.

The dowitcher, or brown back, as it is known in many places, is one of our most important shorebirds, both by reason of its great numbers, its excellence for the table, and the sport it furnishes. If we include under the name "dowitcher" the western form, with its longer bill and other slight differences, the bird may be said to visit all parts of the United States in its migration. It is, however, far more common on the coast than in the interior, and formerly it visited the Atlantic shore in multitudes. The brown-back, however, is one of the most unsuspicious of our shorebirds, and comes to wooden decoys with the utmost readiness. Even after a flock is decimated and the dead and dying cover the ground, the survivors will return again to the fatal spot. No wonder that the multitudes spoken of by many earlier writers no longer visit our shores. There is every reason to believe that the absolute prohibition of the shooting of this bird for a term of years will do much toward rehabilitating the species. Then, with the prohibition of spring shooting and with a small bag limit, it may be possible to retain the brown-back on the list of game birds. But sportsmen may rest assured that anything short of drastic measures will be followed by the extermination of this important wader.

HUDSONIAN CURLEW (Numenius hudsonicus) (See page 132).

Range: Breeds on coast of Alaska from mouth of Yukon to Kotzebue Sound, and on coast of northern Mackenzie; winters from lower California to southern Honduras, from Ecuador to southern Chile, and from British Guiana to mouth of Amazon.

Within the memory of many still living, the jack curlew, as this bird is best known to sportsmen, was the least abundant of the three species of curlew here mentioned. To-day it is the most numerous if, indeed, we still may speak of the Eskimo curlew as a living species. The journeys of the jack curlew north and south rarely take it into the interior, and except when nesting, it sticks rather closely to the vicinity of salt water. It is difficult to explain just why this curlew should have maintained its numbers so well when its relatives have been so reduced, but persecution has taught it the art of self protection and it is now no easy matter to bag a Hudsonian curlew. Then, too, its inaccessible nesting-grounds aid in its preservation, although in this respect it is no better off than was the Eskimo curlew, while the latter bird had the advantage of an oversea route to South America. It is possible, however, that, while the passage over the ocean saved the Eskimo curlew from the onslaught of sportsmen, except in easterly storms which drove it in large flocks on our coast, it exposed the flocks to the fury of the elements during off-shore gales.

The bristle-thigh, our fourth species of curlew, is little known in America. It certainly summers and probably breeds in Alaska, and in fall disperses widely over the South Pacific islands. It is one of the few water birds that winter in considerable numbers in Hawaii.

ESKIMO CURLEW (Numenius borealis) (See page 132).

Range: Breeds on the barren grounds of northern Mackenzie; winters in Argentina and Patagonia.

The Eskimo curlew is an interesting example of the rapidity with which a game bird, apparently numerous enough to defy fate, may be suddenly swept off the face of the earth. Forty years ago, and even less, as many witnesses besides myself can testify, Eskimo curlews might often be found in the markets of Boston, New York, and other large eastern cities, and apparently no one then had a suspicion that the species was nearing its end. Audubon, speaking of his experience in Labrador in 1833, likened the numbers of this curlew to the flocks of passenger pigeons, and as late as 1860 Packard noted a flock in Labrador which was perhaps a mile long and nearly as broad. Not many years ago the fishermen of Labrador and Newfoundland were salting them down by the barrelful for winter's consumption. Because of its uncommon fatness and the excellence of its meat, it was generally known in New England as the "dough bird." No doubt these qualities were the chief cause of the curlew's extinction. Thus the very qualities that should have insured the perpetuation of the species for the benefit of posterity led to its destruction by our improvident selves. The bird is spoken of here as extinct since, to all intents and purposes, it is so, although a few probably still survive. The lesson to be drawn from the destruction of the curlew and the passenger pigeon is that in the case of any given game bird we cannot tell exactly when the danger line is crossed and the safety of the species begins to be threatened. The untimely end of the curlew and pigeon shows that it is the part of wisdom to apply the brakes before the bottom of the hill is reached—in other words, to adopt effective preventive measures before it is too late.

LESSER YELLOW-LEGS (Totanus flavipes) (See page 134).

Range: Breeds from Kotzebue Sound, Alaska, northern Mackenzie, central Keewatin, and southern Ungava to valley of the Upper Yukon, southern Saskatchewan, and northern Quebec; winters in Argentina, Chile, and Patagonia.

The mention of the lesser yellow-legs inevitably recalls to mind its larger relative, for the two birds resemble each other in many ways. Formerly the lesser yellow-legs was extremely abundant over most of the United States east of the Rockies, west of which range it occurs only casually. Like so many of its relatives this bird seeks the seclusion of the far North to nest, and reaches the Mackenzie River region by the Mississippi Valley route the early part of May, thus being, as Professor Cooke notes, about the earliest of our shorebirds to reach high northern latitudes. Naturally it is one of the first to complete its nesting, and it begins its southern journey early in July, the greater number having left the barren grounds by the end of August. Its principal migration route in fall appears to be the Atlantic coast, and not many years ago early yellow-legs shooting was eagerly looked forward to by the impatient sportsmen. No doubt many flocks join the curlew and plover on their journey over the ocean and reach South America by the all-water route. Were a census of the yellow-legs possible it would show a woeful diminution of numbers in the last fifty years. Both Audubon and Nuttall appear to have regarded the bird as one of the most numerous of American waders, and many who are still active hunters can recall the days when big bags were common. The yellow-legs, however, decoys well, and when a flock has been decimated by the first discharge will frequently return at the whistled call. The trustfulness of shorebirds is great, their wiles few and ineffective, and they have to pay the natural penalty, since there is little pity in the heart of the man with a shotgun.

BLACK TURNSTONE (Arenaria melanocephala) (See page 134).

Range: Breeds from Kotzebue Sound south to the valley of the Lower Yukon; winters from British Columbia south to Santa Margarita Island, Lower California.

The black turnstone is the Pacific-coast representative of the common ruddy turnstone of Atlantic shores. Little is to be said of its habits that is not equally applicable to its fellow, of which, except for color, it is a near counterpart. Black turnstones arrive at the mouth of the Yukon about the middle of May. Nelson found it far more numerous in summer on the Bering Sea coast than the ruddy turnstone, and it was nesting wherever found. Like its near relative, the black turnstone resorts to the interior only to nest, and as soon as the young are able to accompany their parents all betake themselves to the coast where on the sea beaches and the rocky islands they find the small marine creatures upon which chiefly they live. They winter mostly on the coast of Lower California. At the present time the black turnstone is more numerous than the ruddy. Turnstones are still comparatively numerous on the west coast, chiefly no doubt owing to the abundance of more highly prized game. Indeed, in California and other Pacific States, it is only in comparatively recent years that the smaller species of shorebirds have received any attention at the hands of sportsmen, or even gunners. When I first visited San Diego in 1887, the shores of the northern end of the bay were dotted with many kinds of shorebirds, including curlew. They were very tame, and apparently were never disturbed by a hostile shot. Indeed they were considered hardly fit to eat, and certainly not worth powder and shot when ducks, brant, and geese were to be had with very little trouble.



Photo by Stanley Clisby Arthur. Courtesy of the Conservation Commission of Louisiana

A HAPPY FAMILY: MALLARDS "TIPPING UP" ON THE LOUISIANA STATE GAME PRESERVE

The water bottoms of the lowlands grow duck food in abundance

and to-day there are probably not far from five millions who are interested in the pursuit of game!

The enormous number of men in a single State who hunt appears from a statement of the Secretary of the Game Commission of Pennsylvania, who says that "during the season of 1913 there were 305,028 resident hunter's licenses issued in this State. During the season of 1914, from reports at hand, there were fully as many licenses issued.

"When we consider that the landowner with his tenants and their families may hunt under the provisions of law without paying this license, and add to this those who hunt in violation of law, we are led to believe that fully 100,000 more men hunted in this State during each of these seasons than were licensed, making all together an army of more than 400,000 men, who, for a certain period and for good reason, are permitted to destroy game that in the aggregate amounts to millions of pieces and thousands of tons in weight."

Large as the figures seem, and they are the largest for any State in the Union, it should be remembered that they represent but 5 per cent of the total population of Pennsylvania, while in the Northwest, notably in Idaho and Montana, more than 10 per cent of all the people are licensed hunters.

What this army of five million hunters means to the large and small game of America can better be imagined than described! Modern guns and ammunition are of the very best, and they are sold at prices so low as to be within the reach of all. Added to these very efficient weapons for killing small game, are innumerable devices for killing waterfowl, as sneak-boats, punt-guns, swivel-guns, sail-boats, steam-launches, night floating, night lighting, and others.

While it is true that most of these devices are illegal, they are nevertheless in use at the present time, and in out-of-the-way places offenders are difficult of detection, especially as they are often intrenched behind local sentiment, which countenances and even encourages the practice because "it brings money into the county." To the above devices for the destruction of game must be added the automobile, and it may be doubted if any other modern invention is so potent for harm. It is possible for a party of three or four in a speedy machine to hunt over territory in a single morning that formerly would have required a week or more.

MONEY VALUE OF GAME BIRDS

Passing by for the moment all esthetic considerations, the money value of the vast number of game birds that breed within the several States or visit them in migration is so great as alone to entitle the birds to careful protection. This point of view is being taken by several States Thus Oregon values her game resources, which consist in no small part of game birds, at five millions of dollars annually, while Maine and California respectively claim their game to be worth twenty millions annually.

To permit the extermination of any part of this valuable food asset, valuable alike to State and Nation, by continuing the wasteful methods of the past is an economic crime against present and future generations. And here it is important to point out that while the majority of our ducks, geese, and swans breed outside our jurisdiction they winter within our own borders. Failure adequately to protect them, therefore, in their winter quarters means their ultimate extinction

SALE OF GAME BIRDS

Intimately connected with the problem of conserving our wild game is the killing of game for market. Many of those who have studied the subject earnestly do not hesitate to express the conviction that under the conditions now prevailing in the United States the conservation of our ducks, geese, and shorebirds is impossible it their sale in open market continues.

In considering the present effect of the sale of wild game, it must not be forgotten that the demand for game in the United States has enormously increased in the last decade. Even with our present population the market demand is infinitely greater than the supply, and all

the ducks and geese that now breed within our borders and that visit us from the North would not suffice to supply the inhabitants of New York and Chicago, to say nothing of a dozen or twenty of our other large cities, for more than a few short weeks.

Indeed, were the market demand for game to be fully satisfied, all the winged game of America killed during the next two or three seasons could be marketed and eaten. Reaching the great markets in the comparatively small quantity that it now does, game of all kinds commands prohibitive prices for any but the wealthy. As Forbush justly remarks, the present market price of quail is so high as practically to amount to a bounty on the birds' heads and is a constant temptation to the market hunter to kill his quarry, despite State or Federal law, in season and out.

STATE PROTECTIVE LAWS

State or colonial ownership of game was indeed early recognized, but only grudgingly in so far as it was restrictive of the right of the individual to hunt wild game when and where he pleased. Everywhere the feeling prevailed that all wild game belonged to the people, to be killed whenever necessity or inclination prompted, and it may be said that no little of this feeling remains to the present day. The change from the old belief that wild game belonged to him who could take it, to the theory of State ownership of game, marked a long step forward in game preservation. To-day few principles of American law are more firmly established than this, though it was not until 1896 that the principle was formally enunciated by the Supreme Court of the United States.

If the several States, under the principle of State ownership, have failed adequately to protect their game, it has not been for lack of game legislation. Even in the colonial period laws regulating the manner of taking game were passed. As early as 1708 heath hens, ruffed grouse, quail, and wild turkeys were protected in New York; but it was not till 1791 that woodcock were given legal protection. In 1710 a law was enacted in Massachusetts prohibiting the use of boats and canoes with sails, or canoes disguised with hay, sedge, or seaweed, for hunting waterfowl.

Snipe were protected in Massachusetts in 1818, and ducks in Rhode Island in 1846; Connecticut and New Jersey protected their doves and insectivorous birds in 1850, and in 1851 Wisconsin passed protective laws in favor of the prairie chicken. It is worth noting in connection with game legislation that it was not until 1878 that the first bag-limit law was enacted. This limited the bag of game birds in Iowa to 25 in one day—a limit which has remained practically unchanged for 37 years.

Since early times, and especially of late years, game legislation has so flooded the country that it is difficult to keep track of it. Over 1,300 laws were enacted during the first decade of the present century (1901-1910). Despite this great volume of legislation, some birds, as geese, were never given a close season in California, Texas, Arkansas, and other States.

STATE GAME LAWS DIVERGENT

It needs only a glance to show that State laws and regulations affecting game differ widely, even in adjoining States; thus a game bird may be adequately protected by law in one State and be only partially protected in a neighboring State, or not protected at all.

Moreover, the history of game preservation since colonial times in many States reveals no well-defined policy, but a series of regulations constantly changing according to the ever-shifting points of view of State and game officials and the political exigencies of the moment. Even the funds raised by the sale of hunting licenses, in most States ample for effective enforcement of the laws, have not always been devoted to the cause of protection, but often have been diverted to very different uses.

So great is the divergence in the nature and purpose of game legislation of the several States that there would seem to be little hope that the inconsistencies and shortcomings will ever be reconciled. Some who do not realize what has been



Photo by Stanley Clisby Arthur. Courtesy of the Conservation Commission of Louisiana

WILD GEESE OVER MARSH ISLAND, LOUISIANA

Five varieties of geese seek the succulent grasses of Mrs. Russell Sage's gift and in flocks that defy count. "Several of the States now have extensive game preserves or refuges of their own, and a large number of private sanctuaries have been set apart, aggregating many square miles in extent. Conspicuous examples of these are the Ward-McIlhenny preserve, dedicated to wild-life conservation by Charles Willis Ward and E. A. McIlhenny; Marsh Island, acquired through the generosity of Mrs. Russell Sage; and the Rockefeller preserve. All these are in Louisiana" (see text, page 155).

accomplished in recent years are inclined to despair.

Meantime, after a century of experiment by the States, the depletion of our game birds continues, and the end of several species is in plain view. It must be evident to all that, so far as the conservation of wild life is concerned, State control has proved a failure. Not a single State has succeeded in adequately protecting its own resident game, to say nothing of the game that migrates through it.

FEDERAL MIGRATORY BIRD LAW

It is the belief of many that what the States have failed to do for the conservation of our bird life can be accomplished by the Federal government, and they further believe that the act approved March 4, 1913, commonly known as the Federal Migratory Bird Law, marks a long step in advance in game protection. By this act the migratory game and insectivorous birds which do not remain permanently within the borders of any one State or Territory are declared to be within the custody and under the protection of the government of the United States.

This act, be it noted, provides protection only for game and insectivorous birds that migrate; hence many of our finest game birds, like the bob-white, valley quail, mountain quail, ruffed grouse, prairie hen, sage hen, blue grouse, wild turkey, and others, being non-migratory, have been left in charge of the several States in which they reside. Here we may leave them, trusting that, notwithstanding past failures, the measures enacted for their benefit will stay the fate with which most of them are threatened.

Migratory birds are on a very different basis from others. Such of the ducks, geese, and shorebirds as still breed within our limits, including Alaska, migrate early to more southerly localities, where they winter. Some of them, in fact, especially the shorebirds, pass beyond our borders and winter south of the tropics. But by far the great majority breed in foreign territory far to the northward of our possessions, and we have no claim on them save as they tarry on their journey for a time along our coasts or on our lakes and rivers or winter in the Southern States.

It seems eminently fitting that these migrants, as they traverse our territory, feeding in one State to-day, in another State to-morrow, should be under Federal control, subject to such regulations as seem likely to preserve the species. The law giving Federal protection has, after a year's trial, met with general approval. Moreover, although its constitutionality has been questioned, its main purposes have been indorsed by the great majority of sportsmen, though among them are many who dissent from certain regulations because they abridge the privileges enjoyed under State law.

In this connection it may not be out of place to direct the attention of sportsmen, many of whom seem to have somewhat misconstrued the purpose of the Federal law, to the fact that the intent of the law was not primarily to increase shooters' privileges by lengthening the open season and enabling them to kill larger bags of game, but to preserve game birds in general, more particularly the ones threatened with extinction.

If the accomplishment of this laudable end curtails to some extent the present privileges of sportsmen, they should not complain, since the ultimate result of the law, if it be enforced, will be largely to increase the number of our game birds. Should it then somewhat curtail the privileges of the present generation of sportsmen, it will at least insure to future generations the perpetuity of our game birds.

Here it may be pointed out that if the present Migratory Bird Law, now before the United States Supreme Court, should fail to meet the test of legal requirements and be pronounced invalid, bird conservationists need not be discouraged, since two courses are open: first, so to amend the law that it will stand every legal test; second, to obtain a constitutional amendment which will effect the desired end.

Amendments to our constitution are proverbially difficult to secure, but who can doubt that with the widespread interest in bird life of the present generation of Americans such an amendment can be obtained in due time.



Photo by Stanley Clisby Arthur. Courtesy of the Conservation Commission of Louisiana

PINTAIL IN FLIGHT: THE LOUISIANA STATE GAME PRESERVE OFFERS SANCTUARY TO BILLIONS OF MIGRATORY WATERFOWL EVERY WINTER

SPORTSMEN AS CONSERVATORS OF GAME

There are many good citizens in the United States who believe that hunting is wrong and who consider all sportsmen arch enemies of wild life. There are sportsmen and sportsmen, and the genuine lover of gun and dog will almost invariably be found to be a lover of nature and at heart a conservationist of wild life.

Be the sportsman what he may, the sportsmen of the United States, as a body, constitute a very important factor in the present struggle to keep wild creatures from total extinction. Many of us who love wild life and who long ago abandoned the use of the gun, nevertheless believe that game exists for reasons other than esthetic. Only extremists insist that all animal life is sacred and must on no account be taken. Birds, in addition to their esthetic value and their importance as allies of the farmer in his warfare on insects, are important as food.

They are also important because they furnish a healthful and exhilarating pursuit to an army of men who at certain seasons take to the woods and fields and because of their outdoor life make better men and better citizens.

BOTH FEDERAL AND STATE LAWS NECESSARY

Since game birds have such strong claims on our interests, it cannot be doubted that both State and Federal laws are necessary for their protection, and the more cordial and complete the cooperation between State and Federal officers, the more effective will be the administration of the laws. Even more essential in the long run is the recognition of the importance of our wild life by the people at large and their hearty sympathy and active coöperation as individuals with efforts for its protection.

Nor should sportsmen and sportmen's clubs be backward in cordial coöperation, since they are among the chief beneficiaries of measures for the preservation and increase of game birds. The need is not for more laws, but rather for fewer, simpler, and more comprehensive statutes. It is the multiplicity of legal enactments subject to constant change, coupled with their non-enforcement, that has been largely responsible in the past for the general decline in the number of our game birds. Fewer laws with better enforcement should be the rule for the future.

THE PRESERVATION AND INCREASE OF GAME BIRDS IS FEASIBLE

A few words may be added on certain practical means, other than restrictive measures, for the preservation and increase of our game birds. One of the most effective is the establishment of sanctuaries where birds may safely resort to nest and feed during migration.

The Federal Government has already demonstrated the utility of this method and has established no fewer than 68 bird reservations in different parts of the United States, including Alaska. If the national parks, large game preserves, and national monuments are added to the list, the government now has more than 100 sanctuaries, some of which include thousands of acres, where birds of all kinds are protected at all seasons.

The example thus set by the government has stimulated both State authorities and private individuals. Several of the States now have extensive game preserves or refuges of their own, and a large number of private sanctuaries have been set apart, aggregating many square miles in extent.

Conspicuous examples of these are the Ward-McIlhenny preserve, dedicated to wild-life conservation by Charles Willis Ward and E. A. McIlhenny; Marsh Island, acquired through the generosity of Mrs. Russell Sage; and the Rockefeller preserve. All these are in Louisiana. That private means are being thus devoted to the public welfare through the protection of birds speaks well for the future.

In furtherance of the sanctuary plan, there would seem to be excellent reasons why the several States, in the interests of their citizens, should set apart tracts of land, and specifically designate them as bird sanctuaries, where all shooting should be prohibited, as it is in the greater part of the District of Columbia. Such tracts, especially if public parks, not only serve the important end of



Photo by Stanley Clisby Arthur. Courtesy of the Conservation Commission of Louisiana

ONE OF THE LAST OF HIS RACE

The millinery trade has almost caused the trumpeter swan to join the passenger-pigeon in oblivion. A male bird of this rare species visited the Louisiana State Game Preserve the winter of 1914-1915 and it is hoped this sanctuary will attract others.

conserving bird life, but possess added value to the public as pleasure resorts. They serve also the cause of education by providing readily accessible places where the habits of wild birds may be studied by school children and others.

VALUE OF BERRY-BEARING SHRUBS

Another important way of caring for both game and insectivorous birds is to provide food for them, especially in winter and during deep snows. This method is particularly effective, since the expense entailed is small and it can be practised everywhere by private individuals. Pittsburgh has a special superintendent whose peculiar care is the birds in the public parks. Several States, as Massachusetts, Connecticut, Vermont, Delaware, and Pennsylvania, have, or recently had, State ornithologists, whose usefulness in practical ways is unquestioned. Their duties include the study of the habits of birds from the economic point of view, and the preparation of reports thereon to aid in the framing of protective legislation.

The planting of berry-bearing shrubs and trees in public parks and along public roadsides is another effective method of caring for our bird life. Already many women's clubs, quick to recognize their opportunity, have taken up this work and are urging park commissioners to make special provisions for the needs of our birds. Such methods bear more directly on the welfare of our seed-eating and insectivorous birds, but they also have a beneficial effect on game birds, especially bob-white and the ruffed grouse.

PRIVATE AND STATE ORGANIZATIONS

Such organizations as the Meriden Bird Club, of New Hampshire, are especially to be commended. This is a local community club as distinguished from the public or private preserve or sanctuary. Its purposes, as stated in its constitution, are as admirable as they are direct and simple: "The objects of this club shall be the increase and protection of our local wild birds, the stimulation of interest in bird life, and the gradual establishment of a model bird sanctuary."

Of wider scope and aims are such organizations as the National Association of Audubon Societies, with its many affiliated State societies; the American Game Protective Association; the Wild Life Protective Fund; and the State Game Protective Associations. The work of these various bodies, individually and collectively, has proved a most important factor in the nation-wide movement to conserve our valuable bird life.

Of recent years instruction as to the economic value of birds and the best ways to conserve them has received much attention in the public schools of many States, and the results are likely to prove fruitful, both now and in the years to come

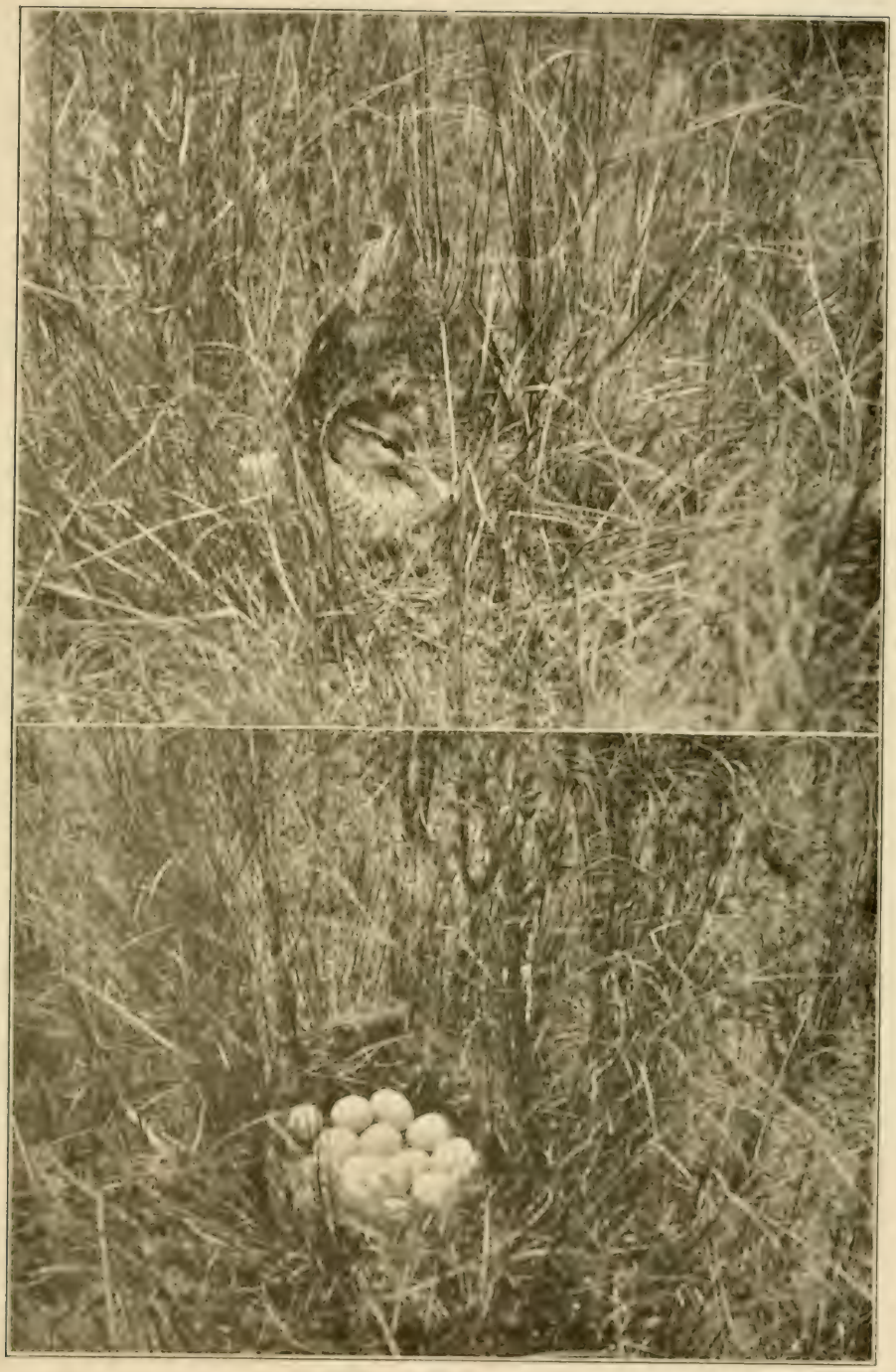
MANY GAME BIRDS CAN BE REARED IN CAPTIVITY

Finally, the artificial propagation of our game birds has a direct and important bearing on their present and future welfare. It has already been demonstrated that bob-white and other quail can be reared in captivity and used to stock depleted covers, while Canada geese, mallards, black ducks, wood-ducks, and others of the goose and duck tribe can be reared under suitable conditions almost as readily as domestic fowls and be used to stock public lakes and ponds. This is a work which may properly be undertaken by State game commissions and in fact has already been begun.

If in consequence of the cessation of spring shooting the numbers of our waterfowl and shorebirds increase, as is confidently expected they will, the sale of hunting licenses in most of the States will provide ample funds for all necessary experiments in the artificial propagation of game on a large scale, and thus be an important factor not only in preserving the species now in danger, but in furnishing game for sport and food.

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Photographs by George Shiras, 3rd

A MALLARD DUCK AND HER EGG-FILLED NEST

In the upper picture the camera sportsman has "shot" this game bird in its northern Michigan breeding ground. The lower picture indicates that the Mallard family will soon be increased by one more than a baker's dozen

ENCOURAGING BIRDS AROUND THE HOME

By FREDERICK H. KENNARD

NOW that our country has really awakened to the importance of bird life to the citizens, and at last enacted some very wise legislation, forbidding the killing of migratory and insectivorous birds, putting migratory game birds under Federal control, and forbidding the importation of plumage from abroad, public interest in birds and their great economic value seems to have been stirred as never before.

Birds come north for the very special purpose of finding a proper place for the rearing of their young, and, this task accomplished, as autumn approaches, soon depart in search of areas where there will be throughout the winter plenty of food and cover and a more congenial climate.

If we want to make our homes attractive to birds, we must always keep the above facts in mind. If in summer we want to attract the migrants from the South, as well as the permanent residents, we must furnish them with proper places for the rearing of their young, which should include not only nesting sites, but cover, food, and water; and if in winter we want to keep some of the permanent residents about our homes and attract migrants from the North, we must remember that they are again in search of food and cover.

Once having attracted the birds, a sharp lookout must be kept in order to protect them from their enemies—cats, bird-hunting dogs, red squirrels, skunks, foxes, and other predatory animals (not forgetting the small boy that used to be ubiquitous), English sparrows, horned owls, and sometimes crows and jays, cooper and sharp-shinned hawks, and last, but not least, the black snake.

HOW TO ATTRACT THE BIRDS

To sum up, if we are to attract birds in summer, we must furnish them with proper nesting sites, cover, food, and also water; and if we want to keep them in winter, we must again furnish them with cover and food, and always protect them from their enemies.

The most important factor in attracting birds is the supplying of cover suitable for their wants. With this properly done, except in the case of birds that nest about buildings or in holes, nature will supply the nesting sites, as well as take care of the food supply, except in winter.

At "The Pines," my place in Newton Center, Mass., we have had for eight years under close observation about 44 acres, comprising three acres of lawn dotted with a few old apple trees, six acres of wet meadow, which are allowed to grow up with tussocks of grass, cedars, alders, wild roses, and the like, and the remaining 35 acres divided into two areas of about equal size. The first of these areas, that about the house, is covered with a growth of pines, hemlocks, cedars, birches, and various other deciduous trees, among which we have taken pains to cultivate suitable coppice and undergrowth, while the second area, covered with deciduous woods, is, on account of a fire that ran through it a number of years ago, almost devoid of the smaller evergreens or protecting coppice and undergrowth (see pages 162 and 163).

In the first of these areas (page 162) some thirty different species of birds breed nearly every year, while in the second area only from three to five different species build their nests.

Almost every one who lives in the country can do something in the way of attractive planting about his house and grounds, and even in the more closely settled suburbs almost every place, no matter how small, can by judicious planting be made attractive to birds. Even a back yard may in its limited way, with proper treatment, be made a regular rendezvous for birds in the vicinity.



Photograph by George B. Sing

A SCREECH-OWL'S FAVORITE NEST-BOX

"Of bird-houses, to be supplied for those birds that nest about buildings or in holes of trees, there seems to be an almost infinite variety: tree stumps, real or artificial, boxes, cottages, houses, large and elaborate mansions, barrel-houses, gourds, flower-pots, tin-cans, shelves, and all kinds of contraptions" (see page 176). The nest-boxes "on my place have been occupied by screech-owls, bluebirds, chickadees, tree-swallows, flickers, white-breasted nuthatches, and great-crested flycatchers" (see page 177).

On suburban places and in the country the use of evergreens, large plantations when possible, is of prime importance as a protection from the elements, as a source of natural food supply, and on account also of the nesting sites they invariably offer. Nothing is finer than a plantation of white pine or hemlock. Spruce and balsam are beautiful and offer tempting nesting sites, while the native red cedar seems a favorite tree for the nest-builders and also contributes



Photograph by Thomas E. Marr and Son

WHERE BIRDS GET FOOD AND PROTECTION—ATTRACTIVE PLANTING, PARTICULARLY OF EVERGREENS, ENCOURAGES THE BIRDS

A turn of the driveway at The Pines, showing plantation of rhododendrons, flowering dogwoods, and black alders, with an undergrowth of ferns and fox-gloves. This is a retreat much frequented in summer by catbirds and chewinks, while in winter it affords both food and protection for many winter birds—provided there are no cats about the place.



Photograph by George R. King

BIRDS DO NOT LIKE THIS LAND, BECAUSE OF THE ABSENCE OF UNDERGROWTH

"The most important factor in attracting birds is the supplying of cover suitable for their wants. With this properly done, except in the case of birds that nest about buildings or in holes, nature will supply the nesting sites, as well as take care of the food supply, except in winter" (see text, page 160).



Photograph by Joseph H. Dodson

A NEST SHELTER

A nest shelter on a tree, with a catbird going into its nest. Robins and brown thrashers also nest in them. "Of bird enemies, cats are undoubtedly the worst, and maudlin sentiment should not be wasted upon them, for they are incorrigible" (see text, page 179).



Photograph by Ernest Harold Baynes

THE FOOD BELL

It supplies grain, etc., automatically from a receptacle above, and may be suspended from a tree or piazza roof or any other place that seems best.



Photograph by Thomas E. Marr and Son

A JUNCO VISITING AN AUDUBON FOOD-HOUSE

"The Audubon food-house has been much used on this side of the water and is most satisfactory. It consists of a square hip roof, with vertical glass sides suspended beneath and open at the bottom, the whole supported on a central rustic cedar post, encircled with food trays beneath the roof. The glass sides protect the food trays from the weather and at the same time admit light and allow of easy observation. These, when placed among the shrubbery about one's house, prove most attractive" (see page 169).

its berries toward the winter supply of food.

There is a huge hill at the edge of the sand dunes at Ipswich, Mass., swept by all the storms that come in from over the ocean, which years ago was as bare as a billiard ball, but upon one side of which the enterprising owner set out a large plantation of evergreens. Today that hillside is a Mecca for the birds from miles around, and noted among the bird lovers of the region for its varying bird life both winter and summer.

From an artistic standpoint, also, the use of evergreens is to be recommended. In these days, when there seems to be such an exodus from city to country, why shouldn't our country homes be made to look as attractive in winter as in summer? While we of the North may not in winter be surrounded by the verdure of summer, we need not content ourselves with the bare poles of deciduous growth. Evergreens protect us and delight our eyes with their color and varying lights and shadows, and what is more beautiful than a pine wood or group of evergreens after a snow-storm?

Those of us who possess farms, while naturally jealous of every encroachment on our fields, can always find some place which may be planted. The immediate surroundings of our farm buildings are in many cases much too bare and bleak.



Photograph by Wilbur F. Smith

PAYING A MIDWINTER VISIT

This shows a bird visitor attracted by the lump of suet fastened to the old pear tree. A lump of suet set in some convenient place is perhaps the surest way of securing bird visitors in midwinter, for it is a food supply they greatly appreciate.

The average house when surrounded by proper planting almost invariably looks better than if left to stand out cold and hard and with base-line unbroken. Windbreaks may almost always be planted somewhere, with benefit to the farm as well as to the birds, while lanes may be bordered with trees and shrubbery and walls covered with vines without any possible encroachment on the fields. An old pasture planted with savin and white pine, hawthorns, elders, barberries, cornels, viburnums, and the like, may easily be metamorphosed into a bird reservation and still be useful as a pasture.

For deciduous growth to be used for cover, choose those berry-bearing trees and shrubs whose berries are most popular with the birds; and, when possible, choose also those that may offer most convenient sites for nest-building.

SOME USEFUL FOOD PLANTS

Care must also be taken in the choice of species, so as to get, if possible, a continuous supply of food, using such plants as the cherry, mulberry, raspberry, blueberry, huckleberry, etc., for the summer supply; elder and the various kinds of dogwood and viburnum, etc., for autumn; while for winter choose those plants which hold their fruit longest, such as the hawthorn, buckthorn, mountain ash, barberry, bayberry, sumach, wild rose, and the like.

Hedges, particularly if they are evergreen, are favorite resorts for birds, both in winter and summer, and an arbor-vitæ hedge is the best of them all. I remember such a hedge about one side of my father's old-fashioned garden that in summer invariably held its quota of robins', song sparrows', and chipping spar-



Photograph by Ernest Harold Baynes

PINE SISKINS AND RED POLLS FEEDING ABOUT A HOUSE: NEW HAMPSHIRE

The pine siskin is a lover of evergreens and spends the winter wandering from copse to copse in search of seeds and pine cones. The red poll is a winter visitor from the far North, and with its rich crimson head and breast makes a pretty picture in the snow.

rows' nests, while in winter it was the protected resort of such birds as stayed with us.

In the Year Book of the Department of Agriculture for 1909 there is a most interesting article on "Plants Useful to Attract Birds and Protect Fruit," by W. L. McAtee. In this there is a list, on page 186, of the best trees and shrubs for attracting birds, given in the order of their attractiveness, as follows: Elders, raspberries and blackberries, mulberries, dogwood fruits, sumachs, wild cherries, blueberries, wild grapes, pokeberries, Virginia creeper berries, bayberries, juniper berries, service berries, holly berries, strawberries, the fruits of viburnums, hackberries, huckleberries, haws, spicebush berries, rose hips, sarsaparilla, sour gum, gooseberries, currants, and snowberry.

To the above list is added the following supplementary list of some other plants known to be attractive to birds, and to this the names of other species doubtless might be added: Manzanita, barberry, buffalo berry, silverberry, buckthorn, mountain ash, China berry, California Christmas berry, pepper tree, magnolia, nockaway, lote bush, and bluewood.

With the above very comprehensive lists to choose from, it is not a difficult matter to make out a list of trees and shrubs for almost any place, no matter how small, that will supply its quota of birds' food from early summer to the following spring, while if the place is a large one, or the problem at all difficult, it may be the best policy, as well as in the end the most economical, to consult some competent landscape architect as to the proper disposition of the proposed plantations. What is worth doing at all is always worth doing well.

Besides the trees and shrubs in the above lists, there are many herbaceous plants whose seeds are attractive to birds. Sunflowers may be planted in groups



Photograph by Ernest Harold Baynes

A SHY HAIRY WOODPECKER AT DINNER

The hairy woodpecker is a somewhat shy bird, who prefers the forest to the orchard and is not often seen about the house. His note is louder and sharper than that of most woodpeckers and cannot by any stretch of the imagination be called musical.



Photograph by Louise Birt Baynes

A FRIENDLY CHICKADEE

The chickadee is found in all parts of the East, from Labrador to Maryland, and in all seasons of the year, but is seen most often in winter. They are unusually companionable birds and their tameness, quaint notes, and friendly ways make them general favorites.



Photograph by Ernest Harold Baynes

A BLUEJAY FEEDING ON SUET

"Perhaps the simplest scheme of feeding, the least troublesome, and the most attractive to numbers of birds, is the tying of a piece of suet to a convenient limb, or perhaps to the balustrade of one's piazza, preferably in a protected spot and one that can at the same time be easily watched from some window" (see page 170).

about the flower garden or in lines among the rows of vegetables; wild sarsaparilla and pokeberry along the boundary walls; while if you have a corner somewhere in the fields that can be planted with buckwheat and Japanese millet, it will prove a great attraction, particularly in winter.

FOOD-HOUSES AND SHELTERS

In bad weather, however, particularly in the North, where we are so apt to be covered up with snow, more artificial means of feeding should be resorted to, and food stations, food-houses, and food shelters of various sorts should be established in proper places. If quail or grouse are to be fed, inconspicuous bough shelters may be built in protected places among the fields or woods most frequented by them, while about the house or among the neighboring plantations all sorts of devices may be resorted to.

A European bird lover has invented a food-house, an adaptation of which, called the Audubon food-house, has been much used on this side of the water, and is most satisfactory (see page 165). It consists of a square hip roof, with vertical glass sides suspended beneath and open at the bottom, the whole supported on a central rustic cedar post, encircled with food trays beneath the roof. The glass sides protect the food trays from the weather and at the same time admit light and allow of easy observation. These, when placed among the shrubbery about one's house, prove most attractive.

The same bird lover has invented also a food bell that supplies grain, etc., automatically from a receptacle above, and which may be suspended from a tree or piazza roof, or any other convenient place (see page 164).

Window boxes are a never-ceasing source of enjoyment. Mr. Ernest Harold Baynes built the first I ever saw at his home in Meriden, N. H., a particularly attractive one, which has helped him to become intimate with an astonishing variety of birds (see page 173).

Food shelves may be put up in all sorts of protected places—about houses, against tree trunks, etc.; and a food car, a sort of moving free-lunch counter, which may be run conveniently on a wire from window to neighboring tree, is actually manufactured by one enterprising gentleman; and the same man builds also



Photograph by B. S. Bowdish

ON INTIMATE TERMS

This jolly little white-breasted nuthatch has just taken a dainty morsel from the lips of its friend. These little birds are very clever climbers and can run up and down tree trunks in the most agile manner.

a sheltered food-house that turns with the wind like a weather vane, so as to present always a lee side for the better protection of the birds.

An ingenious bird lover has originated what he calls a food tree, a freshly cut evergreen, preferably spruce or fir, or perhaps a discarded Christmas tree, set up in some convenient place, over which has been poured hot, and then allowed to cool, a mixture of food that is attractive to both insectivorous and graminivorous birds, the receipt for which is given in the little book, "How to Attract and Protect Wild Birds":

"White bread (dried and ground), 4½ oz.; meat (dried and ground), 3 oz.; hemp, 6 oz.; crushed hemp, 3 oz.; maw, 3 oz.; poppy flour, 1½ oz.; millet (white), 3 oz.; oats, 1½ oz.; dried elderberries, 1½ oz.; sunflower seeds, 1½ oz.; ants' eggs, 1½ oz."

A SIMPLE AND ATTRACTIVE FOOD SUPPLY

Perhaps the simplest scheme of feeding, the least troublesome and the most attractive to numbers of birds, is the tying of a piece of suet to a convenient limb, or perhaps to the balustrade of one's piazza, preferably in a protected spot and one that can at the same time be easily watched from some window (see page 169).

In all these food-houses various kinds of food should be supplied — suet, crumbs, millet, hemp, rape-seed, canary-seed, and the like. On my place the birds have such a wealth of natural food that it is only during the winter storms and when the ground is covered with snow that they visit the food-houses; but on many other places—as, for instance, in Meriden, N. H., where Mr. Baynes and the Meriden Bird Club are doing such good work—there have been food-houses erected on places along the main street, entirely apart from any protecting shrubbery or natural food supply, and many of these food-houses seem to be well patronized both winter and summer.

Water, particularly during the summer months or times of drought, is, of course, necessary for the birds. If they can't get it on your place, they will be forced to look elsewhere. The proper installment of a drinking fountain or bird bath is a simple affair, and one that is almost sure to prove a great attraction to the birds, as well as a never-failing source of entertainment to the owner.

Drinking fountains may be purchased ready made or manufactured at home.



Photograph by Louise Birt Bayne

LUNCHEON FOR TWO

In the midst of a tramp across the winter snow the naturalist halts for a rest and a little lunch, to which he invites a passing bird friend. Cordial relations have already been established, but the repast has not yet been begun (see picture, page 172)



Photograph by Louise Birt Baynes

A SANDWICH FOR TWO

Having accepted the invitation, the bird settles down to enjoy his meal. The fact that he must share a sandwich with his host does not disturb him, for, like all birds, he is quick to recognize and trust a human friend (see picture, page 171).

Almost any shallow receptacle will do when placed in some quiet spot not too far from protecting shrubbery, but out of reach of skulking cats. Where the cats have not all been eliminated, it is sometimes safer to place the bath on a pedestal.

A pool with foundation of concrete sunken in the ground, partially filled with earth and stones and planted with cattails, Japanese iris, or other moisture-loving plants, or perhaps with water-lilies and inhabited by a few goldfish, can be made a very interesting feature of any garden, to say nothing of its attractiveness to birds. It is essential, however, that the slope of the sides should be gradual and the water at the edges shallow (see page 174).

If one has a brook or natural pond on the place, much can be done, particularly if the bottom of the pond is suitable for



Photograph by Ernest Harold Baynes

THE HOSTESS ENTERTAINS

"Window boxes are a never-ceasing source of enjoyment. Mr. Ernest Harold Baynes built the first I ever saw, at his home in Meriden, N. H., a particularly attractive one, which has helped him to become intimate with an astonishing variety of birds" (see page 169).



Photograph by Louise Birt Baynes

TAKING THE CAKE

This photograph shows how responsive birds are to a little attention and how tame they may become. This wild chickadee will enter the house, perch upon his favorite delicacy, and enjoy a meal in no way affrighted by the presence of his human entertainers.



Photograph by Ernest Harold Baynes

SONG-SPARROWS TAKING A BATH

"A pool with foundation of concrete sunken in the ground . . . can be made a very interesting feature of any garden, to say nothing of its attractiveness to birds. It is essential, however, that the slope of the sides should be gradual and the water at the edges shallow" (see page 172).

the planting of food for ducks. If the lay of the ground is such that a meadow or woodland glade may be flooded and a pond thereby installed, there is hardly any limit to the enjoyment that may be derived from a pond of this sort.

There is a little woodland glade, containing an acre or so, on my place, an opening in the woods surrounded by red maples, birches, alders, poison sumach, white azalea, high-bush blueberries, etc., which I flooded one winter merely as a safe skating pond for the children in the neighborhood.

ATTRACTING THE WILD DUCK

Imagine my surprise and delight when one spring day, after the ice had gone, I discovered there a whole flock of wild wood-ducks, and later during the summer was able to watch a flock of little "flappers," the progeny of a pair of wild black ducks that had bred there. Herons came there, too, and red wings frequented the edge of the pond. From an uninteresting swamp the place had been completely metamorphosed into a very attractive and interesting spot, replete with bird life.

If wild rice can be made to grow, ducks will be sure to come in greater numbers each year, while regular feeding with corn at proper times may prove an additional attraction to whole flocks of ducks during the migration. Tame call-ducks may be introduced, and if there are near-by woods nest boxes for the attraction of the wood-ducks should be put up.

One may even go into the raising of ducks, though this is often both bothersome and expensive, while the simple flooding of a meadow and intelligent planting of its shores is comparatively little trouble.

Mr. Herbert K. Job, State Ornithologist of Connecticut, is having some very



Photograph by Dr. John C. Phillips

A FLOCK OF MALLARDS AS VISITORS

"If wild rice can be made to grow, ducks will be sure to come in greater numbers each year, while regular feeding with corn at proper times may prove an additional attraction to whole flocks of ducks during the migration. Tame call-ducks may be introduced, and if there are near-by woods, nest-boxes for the attraction of the wood-ducks should be put up" (see page 174).



Photograph by Herbert K. Job

WILD BLACK DUCK ON A GAME PRESERVE

"Mr. Herbert K. Job, State Ornithologist of Connecticut, is having some very interesting experiences on a game preserve in Connecticut, where low-lying areas have been flooded and the wild ducks attracted in increasing numbers each year from miles around" (see page 174).



Photograph by Ernest Harold Baynes

A BALTIMORE ORIOLE AFTER A BATH

The Baltimore oriole is remarkable for its bright colors, and to these it owes its name, as the livery of the Lords Baltimore, who founded Maryland, was orange and black of just those tones that the bird exhibits. Cats have been eliminated on this place.

interesting experiences on a game preserve in Connecticut, where low-lying areas have been flooded and the wild ducks attracted in increasing numbers each year from miles around (see picture, page 175).

I know of one man in Canada who several years ago fed a small flock of wild geese that chanced to alight in a pond close beside his house. The geese appreciated the treatment so much that they later returned with friends, and have kept it up from year to year until now I believe that he has had at one time several hundred wild geese virtually in his front yard, and in a very exposed position at that. They seem absolutely fearless, come and go at will, though only a short distance away are gunners who are waiting to take a crack at them.

Only a few of us have ponds to which geese may be attracted, but the foregoing experiment shows what can be and has been done in the way of attracting and taming locally the shy wild geese.

HOUSES FOR THE BIRDS

Of bird-houses, to be supplied for those birds that nest about buildings or in holes of trees, there seems to be an almost infinite variety—tree stumps, real or artificial, boxes, cottages, houses, large and elaborate mansions, barrel-houses, gourds, flower-pots, tin cans, shelves, and all kinds of contraptions.

Mr. Ernest Thompson Seton went so far as to construct on his place in Connecticut a huge artificial stump, filled with imitation woodpeckers' holes, etc. He attracted numbers of different kinds of birds and animals, and he seems to have had no end of fun with it. It is not allowed to all of us, however, to be given either the opportunity or the enthusiasm possessed by Mr. Seton.

Of the various kinds of houses space will allow but brief mention. On my own place, which is covered largely with woods, I have used one special type of vertical boxes with considerable success. These are simply sections of logs, hollowed out by special machinery in a very particular manner to represent woodpecker cavities, with entrance hole in side, of desired diameter, and covered by a wooden cap or roof that may be lifted for purposes of investigation or in order that the nests may be cleaned out from

time to time, the whole bolted to an oaken batten, by which they may be fastened to trees (see page 161).

These were formerly obtained in Europe, but are now manufactured by at least two people in this country. Those on my place have been occupied by screech-owls, bluebirds, chickadees, tree-swallows, flickers, white-breasted nuthatches, and great-crested flycatchers. House-wrens, which are very local in our part of the country, have so far avoided them, and I have failed ignominiously to attract either the downy or the hairy woodpeckers, both of which frequent my woods.

One firm makes bird-houses out of natural hollow logs or limbs, with a hole bored in the side, and wooden cap and bottom, while another makes an imitation woodpecker's nest of pottery. The type previously described is, however, in my opinion, far and away ahead of these others.

BIRDS THAT WILL NEST IN PREPARED HOUSES

About houses and buildings, particularly those on our farms, the ordinary type of bird-house rather than the hollow log is perhaps more appropriate. Bluebirds, tree-swallows, and house-wrens take to them readily, and if you have a large house on a high pole you may be lucky enough to attract a colony of martins. Chickadees, great-crested flycatchers, and screech-owls may use these boxes, and the following is a list of birds



Photograph by Louise Birt Baynes

THE DAINTIEST GUEST

A picture of an inquisitive and very puzzled humming-bird probing an artificial flower



Photograph by Ernest Harold Baynes

MOTHER AND DAUGHTER

This is a photograph of a wild chickadee feeding her young in June. She does not fear in summer the hand that feeds her in winter.



Photograph by Ernest Harold Baynes

THE BEST KIND OF A BIRD ON A HAT

recorded as having bred in nest boxes of one sort or another:

Wood-duck, sparrow-hawk, screech-owl, flicker, red-headed woodpecker, great-crested flycatcher, starling, English sparrow, house-finch, tree and violet green swallow, purple martin, house-wren, Parkman's wren, Bewick's wren, Vigor's wren, and Texas Bewick's wren, white-breasted nuthatch, tufted titmouse, black-capped chickadee, Oregon chickadee, Carolina chickadee, robin, and three varieties of bluebirds—eastern, western, and mountain. To this list the Carolina wren ought probably to be added; for while I do not know personally of any record of its actually building in a bird-box, it builds about houses and in the most unheard of and crazy places.

Robins and phœbes may be encouraged by shelves conveniently placed beneath the roofs of porches, piazzas, and sheds, while the insect-eating barn and eave swallows may often be helped in their choice of nesting sites by a supporting shelf. Vines on trellises or about the piazza posts are attractive nesting sites for chipping sparrows, as well as robins, and I once knew of a bluejay that built in a wistaria vine overhanging a friend's front porch.

One can never tell just what birds are going to do. Crows are reported to have nested in one of the squares in the city of Philadelphia and on Beacon Hill in Boston, while a pair of sparrow-hawks have bred beneath the eaves of the Lawrence Scientific School in Cambridge, Mass.

Chimney swifts should also be encour-

aged, and when possible the chimneys left open at the top, and so constructed as to admit of their ready occupancy.

THE ENEMIES OF THE BIRDS

Of bird enemies, cats are undoubtedly the worst, and maudlin sentiment should not be wasted upon them, for they are incorrigible. The plain, ordinary alley cat should be eliminated when possible, and they make fine fertilizers when planted about the roots of one's favorite grape-vine. Cat-possessing neighbors should be warned that if their cats are caught trespassing they will be turned into fertilizer.

Red squirrels are next on the list and should be shot on sight, but I have never found the depredations of the gray squirrel to warrant similar treatment. Bird-chasing dogs are a nuisance and should be restrained during the breeding season.

Skunks and foxes should both be discouraged, and the wily raccoon and elusive weasel also, if perchance they are found to lurk about.

Of the hawks, the cooper and sharp-shinned hawks should both be shot at sight, while of the owls, the great horned is incapable of reform. The little screech-owl is almost always beneficial on account of the numbers of mice it often destroys, but individual screech-owls are often destructive to bird life.

Crows and jays will bear watching. There seem to be good crows and jays, and then again individuals among them of exceeding bad habits, as many a long-suffering bird family knows to its sorrow.

In many places the English sparrows are pests and should be shot and trapped relentlessly. They are pretty canny birds, and if once they learn you are after them with a gun they quickly desert the premises. If, owing to surrounding conditions, gunning for them seems undesirable, traps may be used with telling effect. There are several kinds in use in this country.

Last, but not least, the black snake should be killed whenever found; its large size, great activity, tree-climbing propensities, and taste for eggs and small birds have fairly won for it the reputation of being one of the birds' deadliest enemies.



Photograph by George Shiras, 3rd

BIRDS CAN TAKE THEIR OWN PICTURES (SEE PAGES 101-104)

After trying vainly for more than an hour to photograph comparatively tame buzzards and vultures, Mr. George Shiras, 3rd (the inventor of flashlight photography of wild animals and birds, and of a method by which animals and birds take their own photographs), abandoned the blind behind which he had been concealed and set out his automatic camera with string and bait. On returning in about half an hour he found the bait gone, and the development of the plate some hours later revealed the above picture of a black Florida vulture and tame buzzards. Consult numerous articles by Mr. Shiras in the NATIONAL GEOGRAPHIC MAGAZINE.



THE LONGEST SINGLE FLIGHT MADE BY ANY BIRD—2,500 MILES ACROSS THE OCEAN FROM NOVA SCOTIA TO SOUTH AMERICA

This map shows the migration route of the golden plover, which uses a different course on its return from its winter home (see pages 185 and 187)

OUR GREATEST TRAVELERS

Birds that Fly from Pole to Pole and Shun the Darkness; Birds that Make 2,500 Miles in a Single Flight

By WELLS W. COOKE

Of the Biological Survey, U. S. Department of Agriculture

THE migration of birds has long been considered an unfathomable mystery, but recent investigations have furnished abundant data on the when and where of migration and solved many of its puzzles. The Bureau of Biological Survey of the United States Department of Agriculture has collected much information on the migration of North American birds, and this article is an attempt to put in popular form some of the data that have already appeared in the more technical bulletins and reports. No correct understanding of bird migration is possible until it is considered as a voluntary evolution. All migratory movements must have begun with changes of location that were only very slight.

From this short migration, benefit accrued to individuals or to their posterity. Migration became a fixed habit, and the distance covered gradually—very gradually—increased as each succeeding extension proved advantageous. It is not to be supposed that every attempted extension was a success; in fact, it is more probable that only a small part of the experimental pioneering routes were permanently adopted.

Moreover, it must be borne in mind that the time occupied in the establishment of present migration habits and routes was measured in geologic ages, and there is no reason to suppose that changes took place during these ages any faster than they do now.

It is about a hundred years since the first reliable notes on migration in the United States were recorded, and this period has proven too short to show any perceptible difference in its time, direction, or speed. It can be affirmed, then, that the migration routes of today are the results of innumerable experiments as to the best way to travel from the winter to the summer home and return.

It can also be said that food supplies en route have been the determining factor in the choice of one course in preference to another, and not the distance from one food base to the next. The location of plenty of suitable provender having been ascertained, the birds pay no attention to the length of the single flight required to reach it.

PRINCIPAL MIGRATION ROUTES OF NORTH AMERICA

The shape of the land areas in the northern half of the Western Hemisphere has tended to great variations in migratory movements. If the whole area from Brazil to Canada were a plain with the general characteristics of the middle section of the Mississippi Valley, the study of bird migration would lose much of its fascination. There would be a simple rhythmical swinging of the migration pendulum back and forth spring and fall. But a large part of the space between Brazil and Canada is occupied by the Gulf of Mexico, the Caribbean Sea, and parts of the Atlantic Ocean, all devoid of sustenance for land birds. The two areas of abundant food supplies are North America and northern South America, separated by the comparatively small land areas of Mexico and Central America, the islands of the West Indies, and the great stretches of foodless waters.



MAP SHOWING THE PRINCIPAL ROUTES USED BY BIRDS IN THEIR MIGRATIONS BETWEEN NORTH AND SOUTH AMERICA

The different courses taken by the birds to get around or over this intervening inhospitable region are almost as numerous as the bird families that traverse them, and only some of the more important ones are shown on the accompanying map. The routes are numbered from the east westward.

The middle route, No. 4, is by far the most important. In general it may be said to extend from northwestern Florida and western Louisiana across the Gulf of Mexico to the southern coast of the Gulf (Yucatan to Vera Cruz), and thence by land through Central America to South America. Probably more individuals follow this route than all the other routes combined.

The birds east of the Alleghany Mountains move southwest in the fall approximately parallel with the seacoast, and most keep this same direction across the Gulf to eastern Mexico. The birds of the central Mississippi Valley go southward to and over the Gulf. The birds between the Missouri River and the edge of the plains, and those of Canada east of the Rocky Mountains, move southeastward and south until they join the others in their passage of the Gulf.

In other words, the great majority of North American birds bound for a winter's sojourn in Central or South America elect a short cut across the Gulf of Mexico in preference to a longer land journey by way of Florida or Texas. In fact, millions of them cross the Gulf at its widest part, which necessitates a single flight of 500 to 700 miles.

The peninsula of Florida extends far to the south, and the great island of Cuba forms a convenient stepping-stone between its coast-line and Yucatan. A bird taking this highway would avoid any long single flight; yet, with the exception of a few day-migrating swallows, no bird is known to follow this route. A probable explanation is that southern Florida has vastly less bird food per square mile than the country to the northward, and the birds prefer a single long flight with abundant rations to a series of shorter flights on scantier fare.

Migration route No. 3, which is by way of Cuba and Jamaica, offers a much shorter journey to South America, but it is traversed by only a few species. It is popular as far as Cuba with some 60 species, of whom great numbers spend the winter on the island; about 30 of these species have a small contingent who pass on to make Jamaica their winter resort; but scarcely more than 10 species try the final long flight across the Caribbean Sea to South America. Among these are one species each of six widely differing families—the bank swallow, gray kingbird, Florida nighthawk, Alice thrush, blackpoll warbler, and bobolink. The other members of those families employ entirely different migration routes.

It is not possible to ascertain whether these travelers on the so-called "bobolink route" represent adventurous species that are seeking to improve on the roundabout course through Mexico, or old fogies who hold to the way of their forefathers long after their brethren have proven to their own satisfaction the superior advantages of the more western route.

The next route to the eastward, No. 2, traverses the chain of islands that extends from Florida to South America. This, too, is considerably shorter than the Florida-Yucatan route, and land can always be kept in sight; yet this line also is discredited. A few individuals of about 25 species follow it as far as Porto

Rico, and only 6 of these continue to the South American coast, and these last in such diminished numbers as to form an insignificant fraction of the winter visitants in that region.

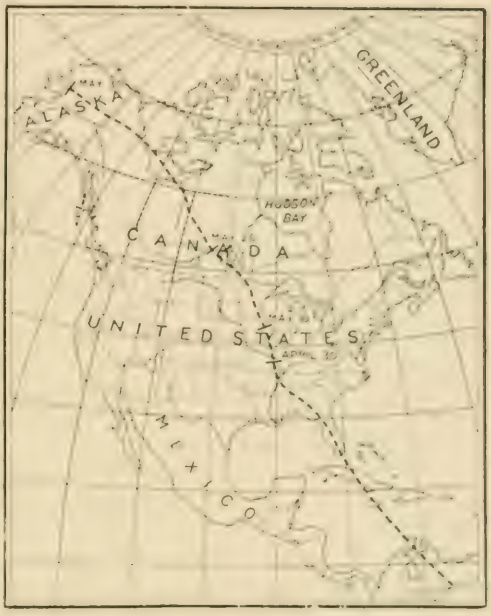
The explanation, of course, lies in the question of food. The combined area of all the West India islands east of Porto Rico is so small that it could not furnish subsistence for even one per cent of the myriads of birds which throng the main migration route across the Gulf.

To the westward the short route, No. 5, stretches a few hundred miles from the coast of Texas to northern Vera Cruz. It is adopted by a few Kentucky warblers, worm-eating warblers, golden-wing warblers, and some others, who seek in this way to avoid a slow journey by land across a region scantily supplied with moist woodlands.

Still farther west, routes 6 and 7 represent the land journeys of those birds from the western United States who winter in Mexico and Central America. Their trips are comparatively short; most of them are content to stop when they have reached the middle districts of Mexico, and only a few pass east of the southern part of that country.

Route No. 1 remains to be noticed. It extends in an approximately north-and-south line from Nova Scotia to the Lesser Antilles and the northern coast of South America. Though more than a thousand miles shorter than the main migration route, it is not employed by any land bird. But it is a favorite fall route for thousands of water birds, and as such will be referred to again more in detail.

It must not be considered that these routes as outlined on the map represent distinctly segregated pathways with clearly defined borders. On the contrary, they are merely convenient subdivisions of the one great flightway which extends from North to South America. There is probably no single mile in the whole line between northern Mexico and the Lesser Antilles which is not crossed each fall by migrating birds. What is meant is that the great bulk of the birds, both as to species and number of individuals, cross the Gulf to eastern Mexico, while to the eastward their numbers steadily diminish.



MIGRATION ROUTE OF THE BLACK-POLL WARBLERS THAT NEST IN ALASKA

This bird winters in South America alongside the cliff swallow, but in summer seems to try and get as far as possible from its winter neighbor. Note how its northward route diverges from the northward flight of the cliff swallow, shown on the map on page 185. It travels at night, often flying several hundred miles in the darkness (see pages 184 and 193).

LIGHT-HOUSES LURE THOUSANDS OF BIRDS TO DESTRUCTION

It is not to be supposed that these long flights over the waters can occur without many casualties, and not the smallest of the perils arises from the beacons which man has erected along the coast to insure his own safety. "Last night I could have filled a mail-sack with the bodies of little warblers which killed themselves striking against my light," wrote the keeper of Fowey Rocks light-house, in southern Florida.

Nor was this an unusual tragedy. Every spring the lights along the coast lure to destruction myriads of birds who are en route from their winter homes in the South to their summer nesting places

in the North. Every fall a still greater death-toll is exacted when the return journey is made.

Light-houses are scattered every few miles along the more than 3,000 miles of our coast-line, but two light-houses—Fowey Rocks and Sombrero Key—are responsible for far more bird tragedies than any others. The reason is twofold: their geographic position and the character of their lights. Both are situated at the southern end of Florida, where countless thousands of birds pass each year to and from Cuba. Both lights are of the first magnitude, on towers 100-140 feet high, and Fowey Rocks has a fixed white light, the deadliest of all.

A red light or a rapidly flashing one repels the birds, but a steady white light piercing the storm and fog proves irresistible. From whatever direction they approach they veer to windward, and then, flying against the wind, seek the object of their infatuation. The larger part do not strike with sufficient force to injure themselves, but, like great moths, they flutter in and out of the light's rays, and finally settle on the platform or framework to await the abatement of the storm or the coming of sufficient daylight to enable them once more to orient themselves.

NEIGHBORS IN WINTER AND REMOTE STRANGERS IN SUMMER

The two maps on pages 183 and 185 show the extremes of direct and circuitous routes of migration. All black-poll warblers winter in South America. Those that are to nest in Alaska strike straight across the Caribbean Sea to Florida and go northwestward to the Mississippi River. Then the direction changes and a course is laid almost due north to northern Minnesota, in order to avoid the treeless plains of North Dakota. But when the forests of the Saskatchewan are reached, the northwestern course is resumed and, with a slight verging toward the west, is held until the nesting site in the Alaska spruces is attained.

The cliff swallows are winter neighbors in South America of the black-poll warblers. But when in early spring nature prompts the swallows who are to nest in Nova Scotia to seek the far-off land where they were hatched, they begin their journey to that region—which is situated exactly north of their winter abode—by a westward flight of several hundred miles to Panama. Thence they move slowly along the western shore of the Caribbean Sea to Mexico and, still avoiding any long trip over water, go completely around the western end of the Gulf. Hence as they cross Louisiana they are moving in the opposite direction from that in which they started. A northeasterly course from Louisiana to Maine, and an easterly one to Nova Scotia, completes their spring migration. This circuitous route has added more than 2,000 miles to the distance traveled.

THE WARBLER TRAVELS AT NIGHT, THE SWALLOW BY DAY

Why should the swallow elect so much more roundabout a route than that taken by the warbler? The explanation is simple. The warbler is a night migrant. Launching into the air soon after nightfall, it wings its way through the darkness toward some favorite lunch station, usually several hundred miles distant, where it rests and feeds for several days before undertaking the next stage of its journey. Its migration consists of a series of long flights from one feeding place to the next, and naturally it takes the most direct course between stations, not deviating for any body of water that can be compassed at a single flight.

On the other hand, the swallow is a day migrant. Little and often is its rule. It begins its spring migration several weeks earlier than the warbler and catches each day's rations of flying insects during a few hours of slow evolutions, which at the same time accomplish the work of migration. It keeps along the insect-teeming shores, and the 2,000 extra miles thereby added to the migration route are but a tithe of the distance covered in pursuit of its daily food.

IDIOSYNCRASIES IN MIGRATION ROUTES

How migrating birds find their way over the widespread regions lying between their winter and summer homes has always been one of the tantalizing

problems of the migration student. A favorite theory of the past, and one still claiming many advocates, is that river valleys and mountain chains form convenient highways along which the birds travel in the spring, and which are easily recognized on the return trip.

The incorrectness of this theory (at least with reference to some species) is proven by the migration routes of the palm warblers. They winter in the Gulf States from Louisiana eastward and throughout the Greater Antilles to Porto Rico. They nest in Canada from the Mackenzie Valley to Newfoundland. To carry out the above theory, the Louisiana palm warbler should follow up the broad, open highway of the Mississippi River to its source and go thence to their breeding grounds, while the warblers of the Antilles should use the Alleghany Mountains as a convenient guide.

As a matter of fact, as shown on the map, page 186, the Louisiana birds nest in Labrador, and those from the Antilles cut diagonally across the United States to summer in central Canada. The two routes cross each other in Georgia at approximately right angles.

Another idiosyncrasy of bird migration is the adoption by the Connecticut warbler of different routes for its southward and northward journeys. All the individuals of this species winter in South America, and, as far as known, all go and come by the same direct route between Florida and South America, across the West Indies; but north of Florida the spring and fall routes diverge. The spring route (page 186) leads the birds up the Mississippi Valley to their summer home in southern Canada; but fall migration begins with a 1,000-mile trip almost due east to New England, whence the coast is followed southwest to Florida.

The Connecticut warbler is considered rare, but the multitudes that have struck the Long Island light-houses during October storms show how closely the birds follow the coast-line during fall migration.

The map represents the spring-migration route as far as at present known.



MIGRATION ROUTE OF THE CLIFF SWALLOWS THAT NEST IN NOVA SCOTIA
(SEE PAGES 184 and 193)

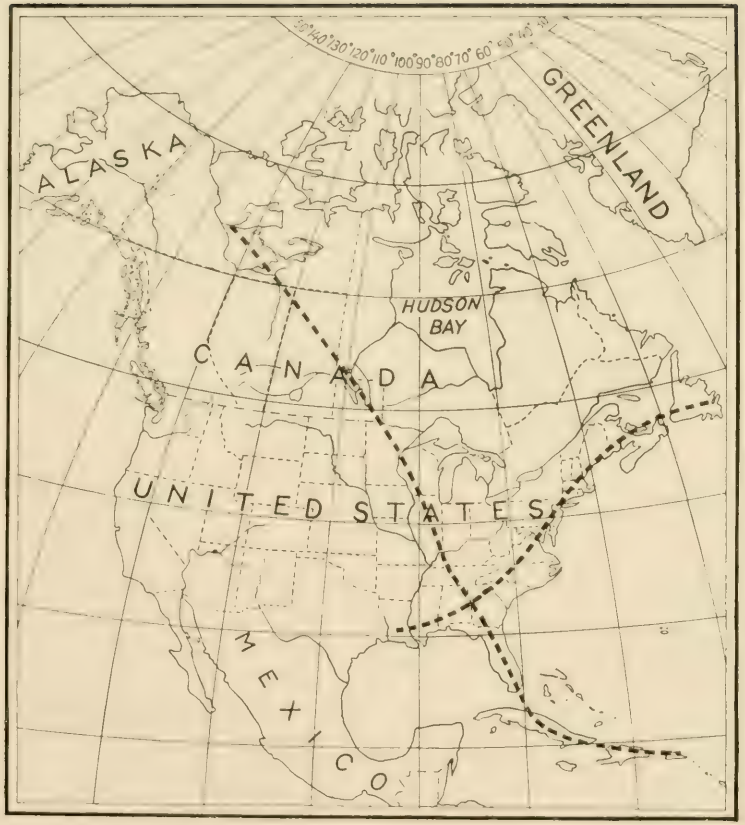
The swallow, unlike the warbler, travels by day

The fact that the route is practically north and south through Ohio and then turns abruptly west indicates a large and as yet undiscovered breeding area in Ontario north of lakes Huron and Superior. Indeed, so little is known about the nesting of the Connecticut warbler that the eggs obtained by Mr. Seaton more than 25 years ago still remain unique.

Incidentally, this route of the Connecticut warbler is a conclusive argument against the theory that migration routes indicate the original pioneer path by which the birds invaded the region of their present summer homes.

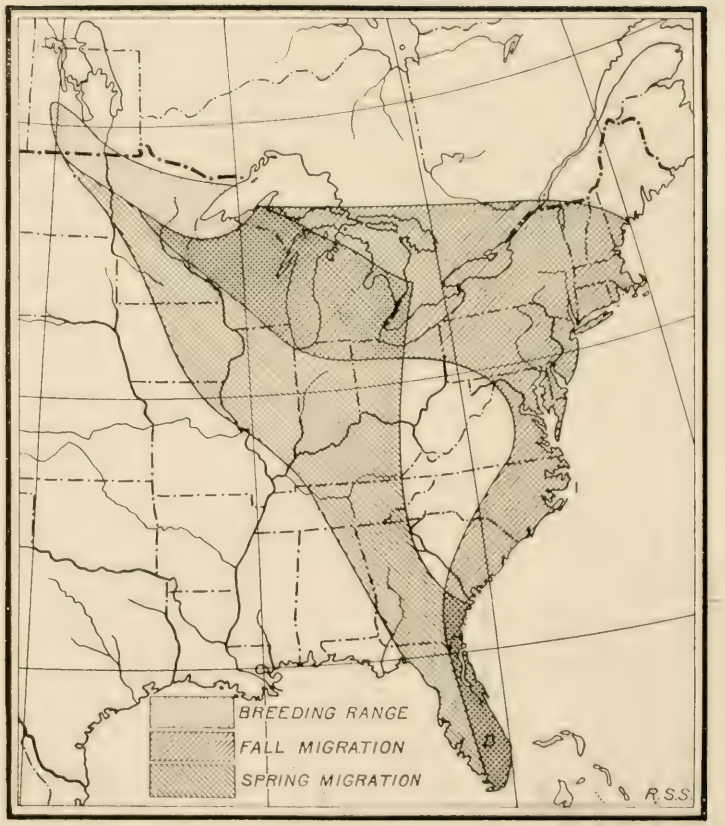
THE LONGEST CONTINUOUS FLIGHT IN THE WORLD—2,500 MILES

Such elliptical migration routes as that mentioned above are rare among land birds, but are used and on a far larger scale by many water birds, notable among which is the golden plover. This species nests along the Arctic coast of North America, and as soon as the young are old enough to care for themselves fall migration is begun by a trip to the Labrador coast, where the plover fattens for several weeks on the abundant native fruits. A short trip across the Gulf of St. Lawrence brings it to Nova Scotia, the starting point for its extraordinary ocean flight, due south to the coast of South America (page 180).



TWO OF THE PRINCIPAL MIGRATION ROUTES OF THE PALM WARBLER

They winter in the Gulf States from Louisiana eastward and throughout the Greater Antilles to Porto Rico. The Louisiana birds nest in Labrador, and those from the Antilles cut diagonally across the United States to summer in central Canada. The two routes cross each other in Georgia at approximately right angles.



THE DIFFERENT ROUTES CHOSEN BY THE CONNECTICUT WARBLER FOR ITS NORTHERN AND SOUTHERN JOURNEYS

All the individuals of this species winter in South America, and, as far as known, all go and come by the same route between Florida and South America, across the West Indies; but north of Florida the spring and fall routes diverge (see page 185).

The golden plover takes a straight course across the ocean, and, if the weather is propitious, makes the whole 2,400 miles without pause or rest. But if tempests arise, it may be blown out of its course to the New England coast and start anew on the advent of fair weather; or it may rest for a few days at the Bermudas, one-third of the way along its course, or at the nearest of the Lesser Antilles, still 600 miles from the mainland of South America. These, however, are emergency stop-overs, to be resorted to only in case of storms. Having accomplished its ocean voyage, it passes across eastern South America to its winter home in Argentina.

After a six months' vacation here, the plover finds its way back to the Arctic by an entirely different route. It travels across northwestern South America and the Gulf of Mexico, reaching the United States along the coasts of Louisiana and Texas. Thence it moves slowly up the Mississippi Valley and by early June is again at the nesting site on the Arctic coast. Its round trip has taken the form of an enormous ellipse, with a minor axis of 2,000 miles and a major axis stretching 8,000 miles from Arctic America to Argentina.

HOW DID THE GOLDEN PLOVER COME TO USE SUCH A DIFFICULT ROUTE?

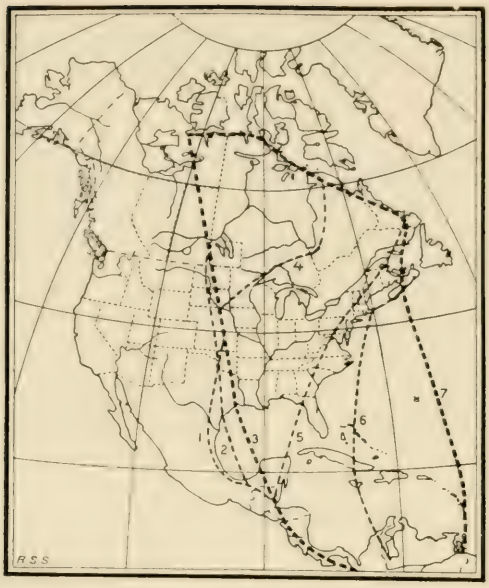
The evolution of the elliptical route of the golden plover, wonderful though it is in its present extended form, is easily traced through its various stages. Toward the end of the glacial era, when the ice began to recede, the peninsula of Florida was submerged and a comparatively small area of land in the southeastern United States was free from ice. Any golden plover that attempted to follow up the retreating ice must have been confined to an all-land route from Central America through Mexico and Texas to the western part of the Mississippi Valley. As larger areas of the eastern United States were uncovered and became available for bird habitation, extension of the route would be to the northeast, until in time the whole of the Mississippi Valley to the Great Lakes could be occupied.

As the migration route lengthened and powers of flight developed, there would arise a tendency to straighten the line and shorten it by cutting off some of the great curve (No. 1, page 188) through Texas and Mexico. A short flight across the western end of the Gulf of Mexico was finally essayed (No. 2), and this gradually lengthened and its points of departure and arrival moved eastward until eventually the roundabout curve through Texas was discarded and the flight was made directly from southern Louisiana across the Gulf (No. 3).

As the great areas of Canada were added to the birds' domain, other conditions arose. Here appeared a vast new stretch of coast and plain—the Labrador peninsula—offering in the fall rich stores of the most delectable berries and fruits; but at migrating time, in the spring, bound by frost and shrouded in fog. Since Chinook winds made the climate of the interior of the continent just east of the Rocky Mountains especially favorable for spring migration, there arose gradually a dividing of the spring and fall routes, the fall route tending eastward (No. 4), while the spring route remained unchanged. When the fall route had worked eastward to the Gulf of St. Lawrence (No. 5), a shortening began to take out the great westward curve of the New England coast. A short ocean flight was attempted (No. 6); and, when this proved successful, it was extended until the present direct route (No. 7) across the Atlantic was obtained.

HOW DOES THE PLOVER FIND ITS WAY EVERY SEASON TO THE LITTLE HAWAIIAN ISLANDS, 2,400 MILES ACROSS THE OCEAN?

The above gives a probable and fairly satisfactory explanation of the origin of the present migration route of the golden plover over the Atlantic Ocean. But this is a very simple problem compared with that presented by the Pacific golden plover. The Hawaiian Islands are in the middle of the Pacific Ocean, distant 2,000 miles from California on the east, 2,400 miles from Alaska on the north, and 3,700 miles from Japan to the west.



MAP SHOWING THE EVOLUTION OF THE PRESENT MIGRATION ROUTE OF THE GOLDEN PLOVER (SEE PAGE 187)

Golden plovers in considerable numbers fly each fall the 2,400 miles across an islandless sea from Alaska to Hawaii, spend the winter there, and fly back again the next spring to nest in Alaska. But how did they first find their way to Hawaii?

It is not to be supposed that any birds would deliberately strike out over unknown seas hunting for a new winter home. It is scarcely more probable that, even if a large flock was caught in a storm and carried far out of its course to the Hawaiian shores, the birds would change in a single season habits of countless generations and start at once a radically new migration route. It has already been said that present migration routes are evolutions—age-long modifications of other routes. The problem, then, is to find some migration route from which the golden plover's present Hawaiian-Alaskan route could have been easily and naturally derived.

The bird breeds on the northern shores of eastern Siberia, from the Liakof Islands to Bering Strait, and on the Alaska side of the strait south to the northern base of the Alaska peninsula (page 189). It winters on the mainland of southeastern Asia, in the eastern half of Australia, and throughout the islands of Oceanica, from Formosa and the Liu Kiu Islands on the northwest to the Low Archipelago in the southeast.

The breeding range has an east-and-west extension of about 1,700 miles, while the winter home extends nearly half around the globe—10,000 miles—from India to the Low Archipelago. Undoubtedly the original migration route was approximately north and south, between the nests in Siberia and the winter resorts in southern Asia. In the course of time the species spread eastward in the winter to Australia, to the islands along the eastern coast of Asia, and throughout Oceanica, while at the same time the breeding range was extended eastward across Bering Strait to Alaska.

If all these extensions took place before there was any cutting off of corners in the migration route, then at this stage of development the Alaska-breeding birds were journeying over 11,000 miles (page 189, No. 1) to reach the Low Archipelago, distant only a little more than 5,000 miles in an air-line.

It is fair to suppose that early in the course of the eastward extension among the Pacific islands, the plover began to shorten the roundabout journey by flights from the northern islands to eastern Asia, and finally to Japan (No. 2). The most northern island is Palmyra, and the flight from there westward to the nearest of the Marshall Islands is about 2,000 miles; thence a 3,000-mile journey, with several possible rests, brings the birds to Japan.

It is easily possible that birds accustomed to this 5,000-mile flight might be driven by storms a thousand miles out of their course and discover Hawaii. When from Hawaii they attempted to reach Japan (No. 3) they would find a chain of islands stretching for 1,700 miles in the desired direction, and the final flight of 2,000 miles from the last of these—the Midway Islands—to Japan would be no longer than previous flights to which they had become accustomed.

Having once learned the route from



MAP TO EXPLAIN HOW THE GOLDEN PLOVER IS ABLE TO NAVIGATE TO THE HAWAIIAN ISLANDS IN THE MID-PACIFIC (SEE PAGES 187 AND 188)

The longest ocean trip without any possibility of resting is shown in this map. This is the same distance as traversed by the Atlantic plover, but the latter can get to land when in trouble. The dotted lines along the Arctic coast show the breeding range of the bird.

the Midway Islands to Japan, it would be natural that the place of alighting on the Asiatic coast should be gradually carried north and east until the direct flight was made from the Midway Islands to the Aleutians (No. 4). A natural and easy carrying of this line eastward would result in the present route (No. 5) between Hawaii and Alaska.

NEIGHBORS AND STRANGERS

Both the American and Pacific golden plovers nest in Alaska near Bering Strait, the former on the north and the latter on the south side of the strait. The American bird reached there by a westward extension from Canada, and the Pacific by an eastward extension from Siberia. The birds themselves are so nearly alike that only an expert can distinguish them; and, notwithstanding they are such near neighbors during the summer—scarcely a hundred miles apart—the beginning of migration makes them utter strangers: for those north of the strait travel 3,000 miles east and then

6,000 miles south to Argentina, while the others make a 3,000-mile flight directly south to their winter home in Hawaii.

THE WORLD'S MOST EXTRAORDINARY TRAVELER

The shore-birds, such as the golden plover, present the longest migration routes among land-feeding birds; but even their surprising records are surpassed by some of the birds which glean their living from the waters. The world's migration champion is the Arctic tern (page 191). It deserves its title of Arctic, for it nests as far north as land has been discovered; that is, as far north as the bird can find anything stable on which to construct its nest.

Indeed, so Arctic are the conditions under which it breeds that the first nest found by man in this region, only 7½ degrees from the Pole, contained a downy chick surrounded by a wall of newly fallen snow that had been scooped out of the nest by the parent.

When the young are full grown the entire family leaves the Arctic, and several months later they are found skirting the edge of the Antarctic continent.

What their track is over that 11,000 miles of intervening space no one knows. A few scattered individuals have been noted along the United States coast south to Long Island, but the great flocks of thousands and thousands of these terns which alternate from one Pole to the other have never been met by any trained ornithologist competent to learn their preferred path and their time schedule.

The Arctic terns arrive in the far north about June 15 and leave about August 25, thus staying 14 weeks at the nesting site. They probably spend a few weeks longer in the winter than in the summer home; and, if so, this leaves them scarcely 20 weeks for the round trip of 22,000 miles. Not less than 150 miles in a straight line must be their daily task, and this is undoubtedly multiplied several times by their zigzag twistings and turnings in pursuit of food.

The Arctic terns have more hours of daylight and sunlight than any other animals on the globe. At their most northern nesting site, the midnight sun has already appeared before their arrival, and it never sets during their entire stay at the breeding grounds. During two months of their sojourn in the Antarctic they do not see a sunset, and for the rest of the time the sun dips only a little way below the horizon and broad daylight continues all night. The birds therefore have 24 hours of daylight for at least eight months in the year, and during the other four months have considerably more daylight than darkness.

THE MOVEMENTS OF THE ROBIN

The number of miles traveled per day by a migrating bird varies greatly in different parts of the migration journey. These variations are intimately connected with corresponding variations in the speed of the northward march of spring, and are based primarily on two facts: First, that the interior of a continent warms up faster than the coasts; second, that spring is hastened in western North America by the Japan current, while it is as decidedly retarded in the east by the polar current.

The results of these two causes are strikingly shown in the migration of the robin (page 192). This bird differs from most others in that throughout its entire course northward it adopts spring's timetable for its own.

The robin's average temperature of migration is 35° F.; that is, it puts in an appearance soon after the snow begins to melt and streams to open, but before vegetation has made any start. These conditions occur in the central Mississippi Valley about the middle of February, and it is the first of March before spring and the robins cross northern Missouri and arrive together in southern Iowa. Thence a whole month is consumed by the birds in their slow progress — 13 miles a day — to central Minnesota. There their pace quickens, to keep up with the northward rush of spring, and another 10 days at doubled speed brings them to southern Canada.

Here they must make an important choice. To the north and northeast lies a land that awakens slowly from its winter's sleep, and where the sun must wage a protracted contest against the cold of



MAP SHOWING SUMMER AND WINTER HOMES OF THE BIRD THAT HATES DARKNESS

The summer home of the Arctic tern is along the Arctic coast of North America; its winter home within the Antarctic Circle, 11,000 miles away. During eight months of the year the bird lives where the sun does not go below the horizon. The track of the tern in its round journey of 22,000 miles is unknown (see page 190).



THE ROBIN MOVES MUCH QUICKER ON THE PACIFIC THAN ON THE ATLANTIC

The dotted lines connect the places at which the robins arrive simultaneously. The heavy solid line marks the division between the eastern and the western forms. The heavy dotted line represents the migration route of the Alaska breeding birds (see pages 190 and 193).

the ice-masses in Lake Superior and Hudson Bay. To the northwest stretches a less forbidding region, already quickening under the influence of the Chinook winds.

THE EASTERN ROBINS MOVE SLOWLY, THE PACIFIC MUCH FASTER

Most of the robins from Missouri that pass through western Minnesota elect to turn to the northwest, and now they must not only keep pace with the rapidly advancing season, but must do so while traveling on a long-drawn-out diagonal. Their daily average rises to 50 miles—four times that in southern Iowa—and later, when for the birds bound for western Alaska the course becomes nearly due west, the rate increases to 70 miles a day—more than six times the speed with which the journey began.

The migration map of the robins shows that these Alaska-breeding birds are the only ones that develop high speed. The robins bound for Newfoundland move by easy stages along the Atlantic coast at the proverbially slow rate of the oncoming of spring in New England, and, scarcely exceeding 17 miles a day, they finally arrive at their destination May 6, when their Alaska-bound relatives are already 1,200 miles farther north.

One of the most interesting things indicated on the map is the migration route of the robins who nest in southern Alberta. They arrive too early to have come from the south or the southeast; hence they must have come from the southwest, though this has necessitated their crossing the main range of the Rockies while the mountains were still in the grasp of winter. Robins remain all winter on the Pacific coast, north to southwestern British Columbia, which has about the same winter temperature as St. Louis, 700 miles southward. Hence the wintering robins of British Columbia are already far north at the advent of spring and do not need any hurried migration to reach Alberta on time. As a fact, they average only 8 miles a day, the slowest rate for the species.

It may be fairly asked, How do we know that the Alaska robins have come all this long distance from the central Mississippi Valley, instead of the far shorter distance from British Columbia? It happens that the robins of the two sides of the continent are slightly different in color and in pattern of coloration. Birds of the western style are not known north of southwestern Saskatchewan, central British Columbia, and southeastern Alaska, while the whole country to the northward is occupied by birds that evidently have come from the southeast. The heavy, solid line on the map shows the approximate meeting-ground of the two forms.

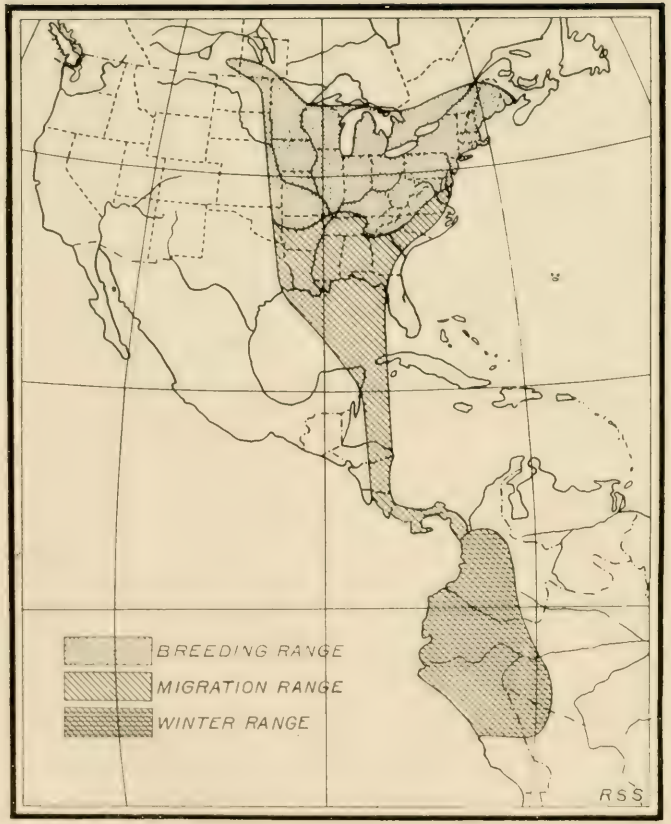
Most migrants except the robins, ducks, and geese wait in their warm winter quarters until springtime is far advanced, and then, traveling swiftly, occupy only a few days in their vernal migration. The black-poll warbler is one of the best examples.

THE WARBLERS AND CLIFF SWALLOWS

While the Alaska-breeding robins start off in February and spend nearly 90 days in going from central Missouri to western Alaska, the black-poll warbler remains in his tropical home during February and March, and is not seen in southern Florida until about April 20. By the first of May he arrives in central Missouri, which the robins left 60 days earlier, and yet he reaches northwestern Alaska only 10 days later than the robins. The latter's 90-day schedule has been shortened by the warbler to 30 days.

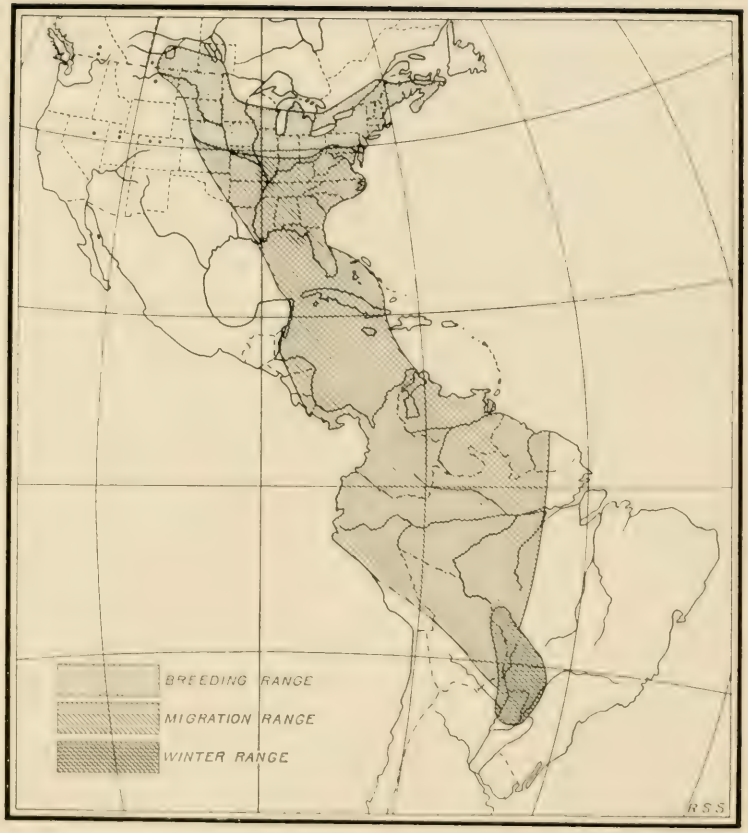
The black-poll warbler furnishes a striking example of speed acceleration during the latter part of migration. As indicated on the map of his migration route (page 183), between April 20 and April 30 he goes from central Missouri to central Iowa, a distance of 300 miles, or an average of 30 miles a day. The next 10 days the rate rises to 100 miles a day, while during the last few days of migration a velocity of 300 miles a day is attained.

In contrast, notice the dates, distances, and speeds indicated for the cliff swallow on its migration-route map (page 185). The swallow must strike out for the north very early, since by March 10 it is already 2,500 miles from the winter home, and yet is averaging only 25 miles



THE SCARLET TANAGER

An example of a migration route much more contracted than either the breeding or winter range (see page 195)



THE MIGRATION ROUTE OF THE BOBOLINK IS CHANGING (SEE PAGE 195)

With the advent of irrigation in the West, nesting colonies of bobolinks are moving toward the Pacific (see page 195)

a day for the next 20 days, while it is rounding the western end of the Gulf of Mexico. It more than doubles this rate while passing up the Mississippi and Ohio rivers. The crossing of the Alleghany Mountains comes next, and there are only 200 miles of progress to show for the 10 days of migration. By this time spring has really come east of the Alleghanies, and the swallow travels 60 miles a day to its summer home in Nova Scotia.

It is to be noted that the swallow, like the robin and the black-poll warbler, works up to high rates of speed when it is traveling on a diagonal, and that except during the 10 days spent in crossing the mountains, each 10 days' travel covers approximately five degrees of latitude.

SOME NARROW MIGRATION ROUTES

The accompanying illustration of the range of the scarlet tanager (page 194) is given to show the narrowness of the migration route as compared with the width of the summer and winter homes. This tanager nests from New Brunswick to Saskatchewan, a region extending over 1,900 miles of longitude. The Mississippi Valley birds go south and the New England birds southeast, until they all leave the United States along 800 miles of Gulf coast from Texas to Florida. The migration lines continue to converge until in southern Central America they are not more than a hundred miles apart. Arrived in South America for the winter, the birds scatter over a district about one-half the area of the summer home, with an extreme east-and-west range of about 700 miles.

THE BOBOLINKS ARE SEEKING NEW ROUTES

The migration route of the bobolink (page 194) shows a similar though not so decided a contraction at its narrowest part. The summer home extends from Cape Breton Island to Saskatchewan, 2,300 miles, and the migration lines converge toward the rice fields of the South, the objective point of all bobolinks, no matter where they nest.

Having gorged themselves to repletion, they press on toward their Brazilian winter abode; but the South Carolina and Georgia birds take a course almost at right angles to that chosen by the scarlet tanagers from those States, and strike out directly across the West Indies for South America. In this part of their journey their migration path contracts to an east-and-west breadth of about 800 miles, while a very large proportion of the birds restrict themselves to the eastern 400 miles of this route. In South America the region occupied during the winter has about one-fifth the breadth and one-third the area of the breeding range.

The bobolinks of New England have witnessed great numerical changes, or evolutions. When the white man arrived on the scene, nearly all of New England was covered by primeval forest and bobolink meadows were scarce. As the forest gave place to hay-fields, the bobolinks promptly took advantage of their chance and their numbers increased steadily until the maximum was reached some 40 years ago. Then the newly invented mowing machine and the horsepower hay-rake began to destroy thousands of nests and caused a marked diminution in the bobolink census.

The case of the bobolink is a fitting close to this article, because it is revealing to us at the present time the manner of evolution of a new migration route. By nature a lover of damp meadows, it was formerly cut off from the western United States by the intervening arid region. But with the advent of irrigation and the bringing of large areas under cultivation, little colonies of nesting bobolinks are beginning to appear here and there almost to the Pacific. Some of them are shown by dots on the accompanying map, and the probability is that the not distant future will see a large increase in these trans-Rocky Mountain bobolinks.

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